Installation Guide v1.0

MFD8/12/BB

READ ME FIRST!

Please read this document before installing and powering ON your NavNet Display

<u>INSTALLATION TOOLS YOU WILL NEED:</u> An ordinary USB MOUSE AND USB KEYBOARD for the MFDBB Installation! These are also helpful with the MFD8/12 Installation.

FURUNO ELECTRIC CO., LTD.

www.furunousa.com

Contents

⚠ SAFETY INSTRUCTIONS

The user and installer must read the appropriate safety instructions before attempting to install or operate the equipment.

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

⚠ Warning, Caution — Prohibitive Action — Mandatory Action

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Do not open the equipment unless totally familiar with electrical circuits.

Only qualified personnel should work inside the equipment.

Turn off the power at the switchboard before beginning the installation.

Fire or electrical shock can result if the power is left on.

Be sure that the power supply is compatible with the voltage rating of the equipment.

Connection of an incorrect power supply can cause fire or damage the equipment.

⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Use the proper fuse.

Use of an incorrect fuse may damage the equipment.

Observe the following compass safe distances to prevent interference to a magnetic compass:

	Standard compass	Steering compass
MFD8	0.90 m	0.60 m
MFD12	0.85 m	0.55 m
MPU-001	1.45 m	0.90 m
MCU-001	0.55 m	0.40 m

Standard supply (MFD8/12)

Name	Type	Part Number (PN)	Qty	Remarks
Multi Function Display	MFD8	-	1	Choose one.
	MFD12	-		
Installation materials	CP19-00900	000-011-780	1 set	For MFD8, CP19-00901*, cables
	CP19-01000	000-011-781		For MFD12, CP19-01001*, cables
Spare Parts	SP19-00701	001-028-020	1 set	For MFD8, fuses
	SP19-00801	001-028-030		For MFD12, fuses
Accessories	FP19-01101	001-023-060	1 set	Panel/Bezel Removal tool

*See the lists at the end of this manual.

Optional supply (MFD8/12)

Name	Types	Part Number (PN)	Remarks
Cable Assemblies NMEA0183 and NMEA2000 Micro-Cables	MJ-A7SPF0007-050C	000-154-028	5 m, NMEA0183, w/7 pin Female connector(DATA1)
	M12-05BM+05BF-010	000-167-962	ϕ 6, 1 m, NMEA2000, w/M-F micro connectors
	M12-05BM+05BF-020	000-167-963	ϕ 6, 2 m, NMEA2000, w/M-F micro connectors
	M12-05BM+05BF-060	000-167-964	ϕ 6, 6 m, NMEA2000, w/M-F micro connectors
	M12-05BFFM-010	000-167-965	ϕ 6, 1 m, NMEA2000, w/micro connector
	M12-05BFFM-020	000-167-966	ϕ 6, 2 m, NMEA2000, w/micro connector

	M12-05BFFM-060	000-167-967	ϕ 6, 6 m, NMEA2000, w/micro connector
Cable Assemblies Ethernet Network	MOD-Z072-020+	000-167-175	LAN cross, 4-pair, 2 m
	MOD-Z072-050+	000-167-176	LAN cross, 4-pair, 5 m
	MOD-Z072-100+	000-167-177	LAN cross, 4-pair, 10 m
	MOD-Z073-030+	000-167-171	LAN straight, 2-pair, 3 m
	MJ-A6SPF0016-005C	000-159-689	For FAX-30, ETR6N/10N connection
NMEA 2000 Terminators and "T" Connectors	LTWSS050505FMF-TS001	000-168-603	NMEA 2000 "T" Connector, micro
	LTWMC-05BMMT-SL8001	000-168-604	NMEA 2000 terminator, male, micro
	LTWMC-05BFFT-SL8001	000-168-605	NMEA 2000 terminator, female, micro
DVI-D Cable	DVI-D/D SINGLELINK	000-149-054	5 m, for Multi-purpose LCD connection
	DVI-D/D S-LINK	000-150-200	10 m, for Multi-purpose LCD connection
External Buzzer	OP03-136	000-086-443	Suggest Radio-Shack 273-070 or equivalent
Junction Box	FI-5002	000-010-765	For FI-50 series/NMEA2000 Terminal Strip Connections
Rectifiers Furuno AC-to-DC Power Supplies	RU-3423	000-030-443	w/o PSU-012
	PR-62	000-013-484	100VAC, w/PSU-012
		000-013-485	110VAC, w/PSU-012
		000-013-486	220VAC, w/PSU-012
		000-013-487	230VAC, w/PSU-012
Network Hub	HUB-101	-	NN3D Hub with Sleep Mode Signal Compatibility

RJ45 Junction Box	RJ45-to-RJ45 Straight	RJ4-5CN-STR	For Mast-Step or LAN cable extension
Connector Boot	OP19-7	001-028-090	Waterproofing Kit for MFD8/12 exposed connection points
Operator's Manual	OME-4440	000-167-802	
NMEA 2000 Interface Unit	IF-NMEA2K1	-	Use where NMEA2000-to-AD10/0183 Data conversion is required for legacy products

Standard supply (MFDBB)

<table>
<tr><th>Name</th><th>Type</th><th>Code No.</th><th>Qty</th><th colspan="2">Remarks</th></tr>
<tr><td>Processor Unit</td><td>MPU-001</td><td>-</td><td>1</td><td colspan="2"></td></tr>
<tr><td>Control Unit</td><td>MCU-001</td><td>-</td><td>1</td><td colspan="2" rowspan="2">Choose one.</td></tr>
<tr><td>Display Control Unit</td><td>DCU12</td><td>-</td><td>1</td></tr>
<tr><td rowspan="3">Installation Materials</td><td>CP19-00600</td><td>000-011-664</td><td>1 set</td><td colspan="2">For MPU-001, Cable, CP19-00601*</td></tr>
<tr><td>CP19-00700</td><td>000-011-663</td><td rowspan="2">1 set</td><td>For MCU-001, cable, CP19-00701*</td><td rowspan="2">Choose one.</td></tr>
<tr><td>CP19-00800</td><td>000-011-662</td><td>For DCU12, cables, CP19-00801*</td></tr>
<tr><td rowspan="2">Spare Parts</td><td>SP19-00501</td><td>001-023-090</td><td>1 set</td><td colspan="2">For MPU-001, fuses</td></tr>
<tr><td>SP19-00601</td><td>001-023-040</td><td>1 set</td><td colspan="2">For DCU-001, fuses</td></tr>
<tr><td rowspan="2">Accessories</td><td>FP19-01201</td><td>001-033-760</td><td rowspan="2">1</td><td colspan="2">For MCU-001, panel remover</td></tr>
<tr><td>FP19-01101</td><td>001-023-060</td><td colspan="2">For DCU12, panel remover</td></tr>
</table>

*See the lists at the end of this manual.

Optional supply (MFDBB)

Name	Types	Code No.	Remarks
DVI-D Cable	DVI-D/D SINGLELINK	000-149-054-10	5 m
	DVI-D/D S-LINK	000-150-200-10	10 m
External Buzzer	OP03-136	000-086-443	

Rectifier	RU-1746B-2	-	
Network Hub	HUB-101	-	
Joint Box	TL-CAT-012	000-167-140-10	For LAN cable extension
Junction Box	FI-5002	000-010-765	For NMEA 2000
Control Unit	MCU-001	-	
Display Control Unit	DCU12	-	
Cable Assy	MJ-A7SPF0007-050C	000-154-028-10	5 m, NMEA0183, w/7P connector
	MJ-A6SPF0016-005C	000-159-689-11	For FAX-30, ETR6N/10N connection
	MOD-Z072-020+	000-167-175-10	2 m, LAN
	MOD-Z072-050+	000-167-176-10	5 m, LAN
	MOD-Z072-100+	000-167-177-10	10 m, LAN
	MOD-Z073-030+	000-167-171-10	3 m, for PC connection
	M12-05BM+05BF-010	000-167-962-10	ϕ6, 1 m, NMEA 2000
	M12-05BM+05BF-020	000-167-963-10	ϕ6, 2 m, NMEA 2000
	M12-05BM+05BF-060	000-167-964-10	ϕ6, 6 m, NMEA 2000
	M12-05BFFM-010	000-167-965-10	ϕ6, 1 m, NMEA 2000
	M12-05BFFM-020	000-167-966-10	ϕ6, 2 m, NMEA 2000
	M12-05BFFM-060	000-167-967-10	ϕ6, 6 m, NMEA 2000
	CB-05PM+05BF-010	000-167-968-10	ϕ10, 1 m, NMEA 2000

	CB-05PM+05BF-020	000-167-969-10	ϕ10, 2 m, NMEA 2000
	CB-05PM+05BF-060	000-167-970-10	ϕ10, 6 m, NMEA 2000
	CB-05BFFM-010	000-167-971-10	ϕ10, 1 m, NMEA 2000
	CB-05BFFM-020	000-167-972-10	ϕ10, 2 m, NMEA 2000
	CB-05BFFM-060	000-167-973-10	ϕ10, 6 m, NMEA 2000
NMEA connector	LTWSS-050505-FMF-TS001	000-168-603-10	NMEA 2000 distributor (micro style)
	LTWMC-05BMMT-SL8001	000-168-604-10	NMEA 2000 terminator, male (micro style)
	LTWMC-05BFFT-SL8001	000-168-605-10	NMEA 2000 terminator, female (micro style)
	LTWNC050505FMF-TS001	000-160-507-10	NMEA 2000 distributor (mini style)
	LTWMN-05AMMT-SL8001	000-160-508-10	NMEA 2000 terminator, male (mini style)
	LTWMN-05AFFT-SL8001	000-160-509-10	NMEA 2000 terminator, female (mini style)
Operator’s Manual	OME-44460	-	
NMEA 2000 Interface Unit	IF-NMEA2K1	-	

1. Mounting

1.1. MFD8/12 Mounting



MFD8



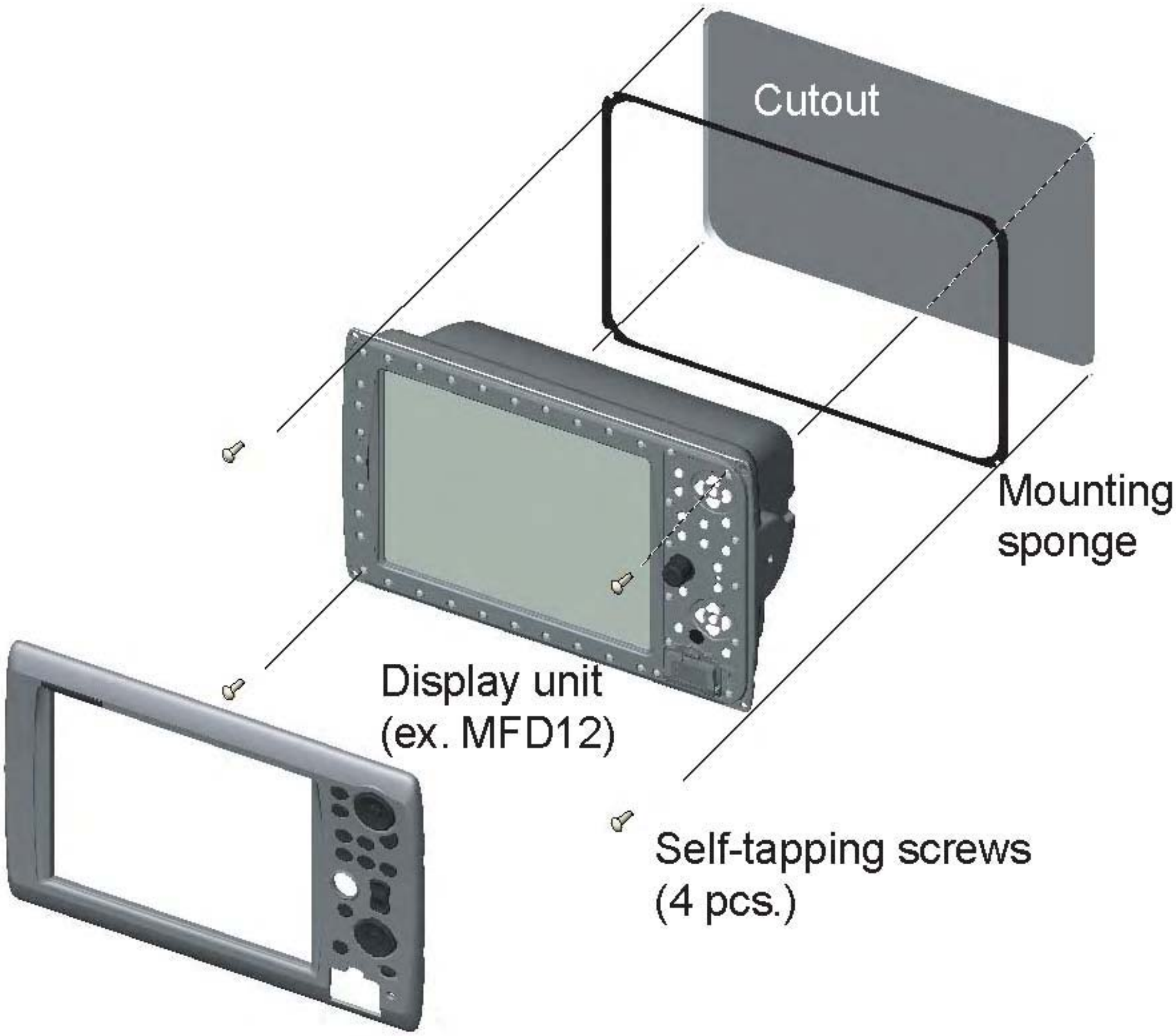
MFD12

When selecting a mounting location for the NN3D MFD8/12, keep the following in mind:

• The temperature and humidity of the mounting location should be moderate and stable.
• Install the unit away from exhaust pipes and ventilators.
• The mounting location should be well ventilated.
• Mount the unit where shock and vibration are minimal.
• Keep the unit away from electromagnetic field generating equipment such as motors and generators.
• For maintenance and checking purposes, leave sufficient space from the sides and the rear of the unit and leave slack in cables. Minimum recommended space is shown the outline drawing for the display units.
•Test and Confirm that the Operator LCD Viewing Angle, which is fixed, is acceptable before permanent MFD8/12 installation. This is very important for Flush Mount Installations!
• A magnetic compass will be affected if the display unit is placed too close to it. Observe the compass safe distances shown in the SAFETY INSTRUCTIONS to prevent disturbances to the magnetic compass.
The MFD8/12 can be flush or bracket mounted in a variety of ways.

1.1.1. MFD8/12 Flush Mounting

1. Prepare a cutout in the mounting location using the template sheet (supplied) for the MFD8 or 12.
2. Remove the front panel from the MFD by grasping it at its sides and pulling it towards you.
3. Attach the mounting gasket (sponge) to the display unit.
4. Fix the display unit by using four self-tapping screws (supplied).
5. Attach the front panel to the display



How to detach the front cover when flush mounted.

To detach the front panel when the unit is flush mounted, use the special tool (supplied) as below. Note that the front cover may be damaged if this procedure is not followed!

1. Insert the tool in the notch on the lower side of the unit



2. Pull the tool to raise the panel slightly. Repeat this action for all notches on the lower side of the unit



3. Insert the tool into the small notches located on the sides of the panel, and pull the tool to raise the panel slightly



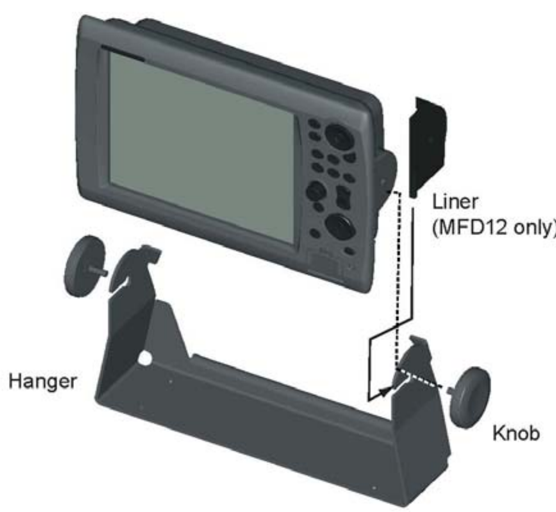
4. Use your hands to detach the front panel from the lower side.



1.1.2. MFD 8/12 Desktop and Overhead Mounting

Follow the procedure below to mount the MFD8 or 12 on a desktop or overhead.

1. For MFD12, attach the liner to each side of the display unit. (Reverse the MFD12 Liners for overhead mounting.)
2. Fix the bracket (Hanger) by using self-tapping screws (supplied).
3. Screw knob bolts into the display unit, set it to the bracket (Hanger), and tighten the knob



1.2. MFDBB Processor Mounting

The unit can be mounted on the deck, a desktop or on a bulkhead. Take special note that the MFDBB IS NOT WATERPROOF._Select a mounting location considering the points below:

• Select a location where temperature and humidity are moderate and stable.
• Consider the lengths of the cables connected among the processor unit, radar sensor and control unit.
• For mounting on a bulkhead, be sure the mounting location is strong enough to support the unit under the pitching and rolling normally encountered on the vessel.
• Leave sufficient space around the unit for maintenance and servicing. Recommended maintenance space appears in the outline drawing at the back of this manual.
• A magnetic compass will be affected if the processor unit is placed too close to the magnetic compass. Observe the compass safe distances in SAFETY INSTRUCTIONS to prevent disturbance to the magnetic compass.

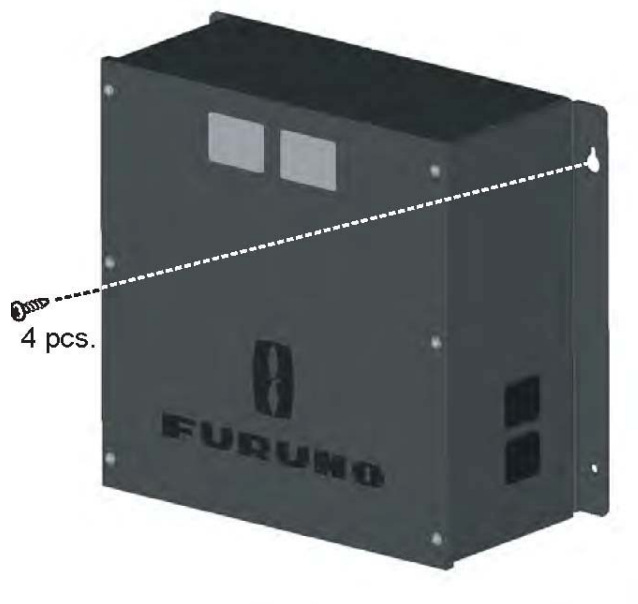
1.2.1. MFDBB Processor Desktop or Deck Mounting

Fasten with four self-tapping screws.



1.2.2.MFDBB Processor Bulkhead Mounting

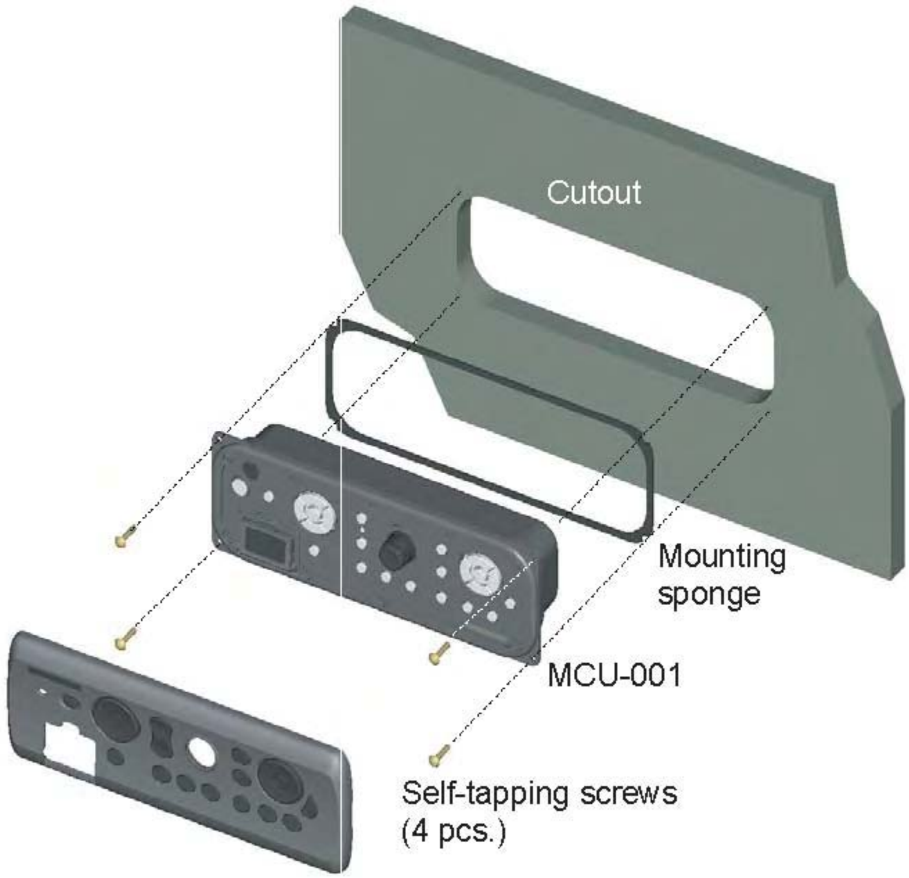
Mark four fixing holes positions on the bulkhead. Screw in two 6x30 self-tapping screws at upper fixing positions, leaving 5 mm protruding. Set the processor unit to the screws and screw in two self-tapping screws at lower positions. Tighten all screws.



1.2.3.MDBBB Keyboard Mounting

The BlackBox keyboard (control unit MCU-001) is designed to be flush mounted in a console or panel.

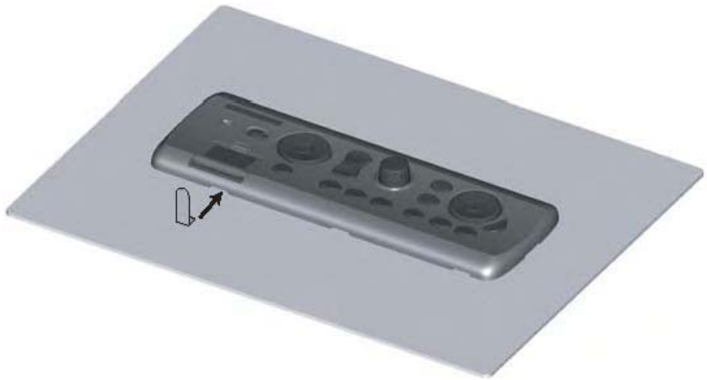
1. Prepare a cutout in the mounting location using the template sheet (supplied) for the MCU-001.
2. Remove the front panel from the MCU-001 by grasping it at its sides and pulling it towards you.
3. Attach the mounting gasket (sponge) to the MCU-001.
4. Fix the MCU-001 by using four self-tapping screws (supplied).
5. Attach the front panel to the MCU001



How to detach the front panel when flush mounted

To detach the front panel when the unit is flush mounted, use the tool (supplied) as below. Do not attempt to remove it by any other method, to prevent damage to the unit.

1. Insert the tool to the left-side notch at the bottom of the unit

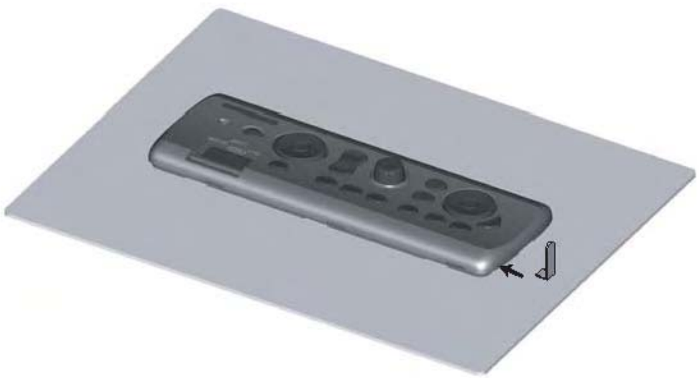


2. Pull the tool to raise the panel slightly



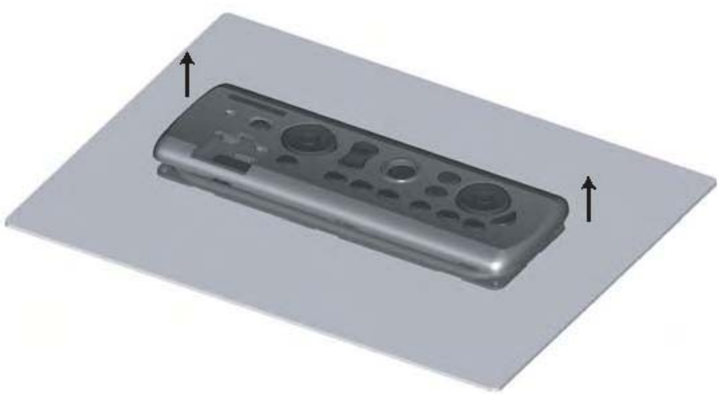
3. Similarly use the tool to raise the panel at the right-side notch.

4. Insert the tool to the space at the one end of the unit, and pull it to raise the panel slightly. Repeat this procedure for the opposite side



5. Use the tool to raise the panel at the two notches on the upper side of the unit.

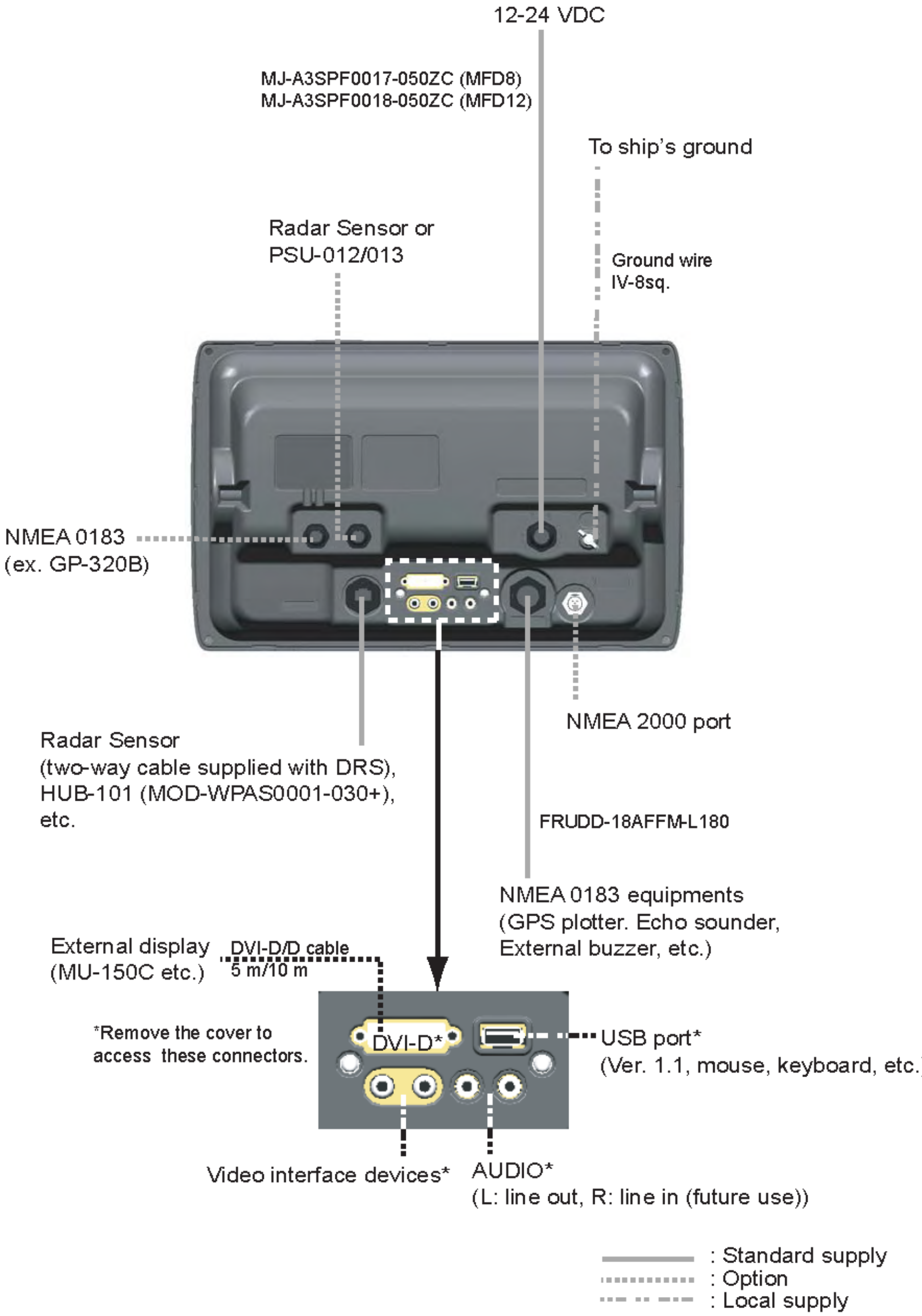
6. Use your hands to detach the front panel at both sides of it



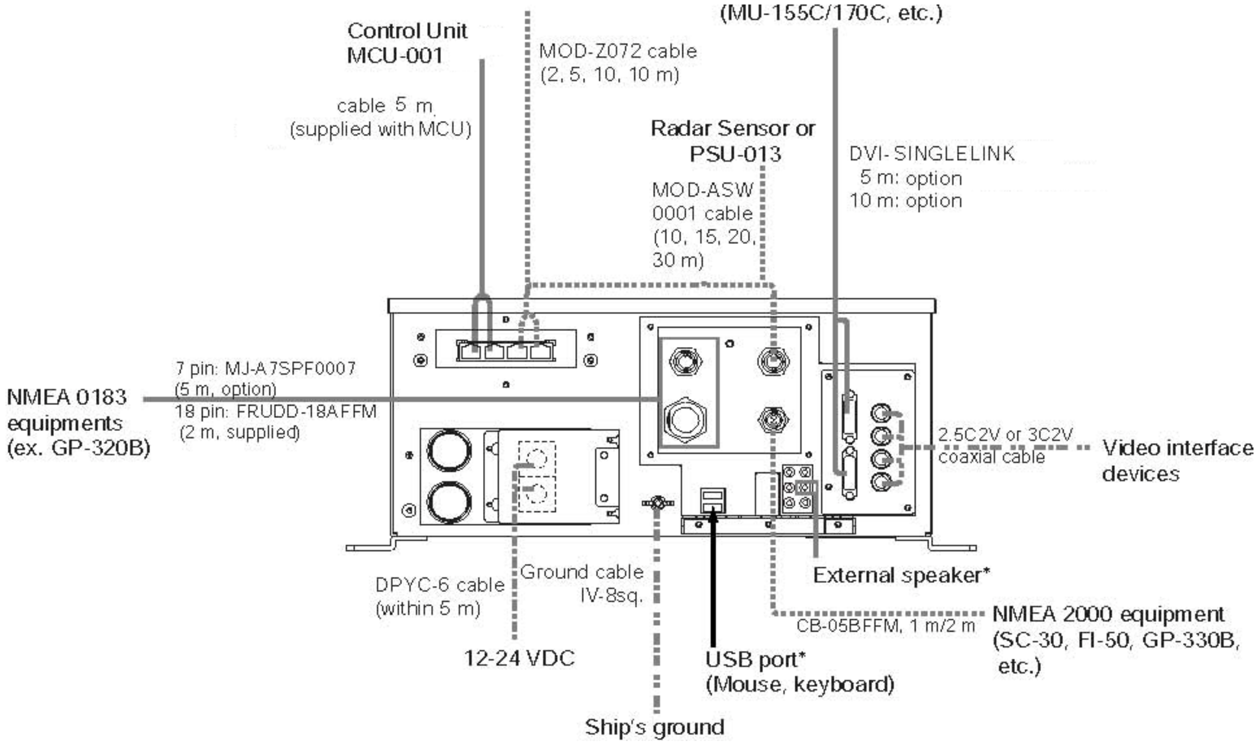
2. Wiring

2.1. Overview

2.1.1. MFD8/12 Overview



2.1.2. MFDBB Overview



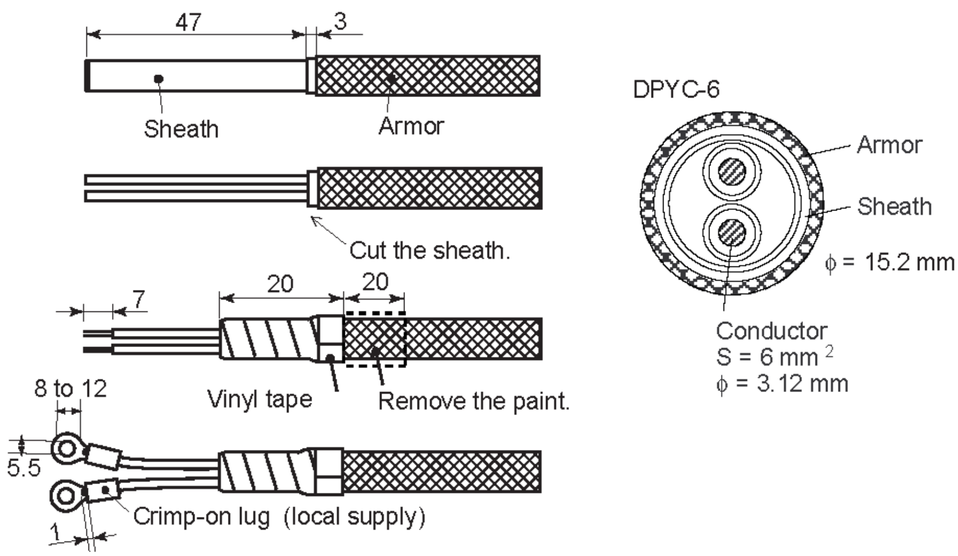
2.2. Power Connections

2.2.1. MFD8/12

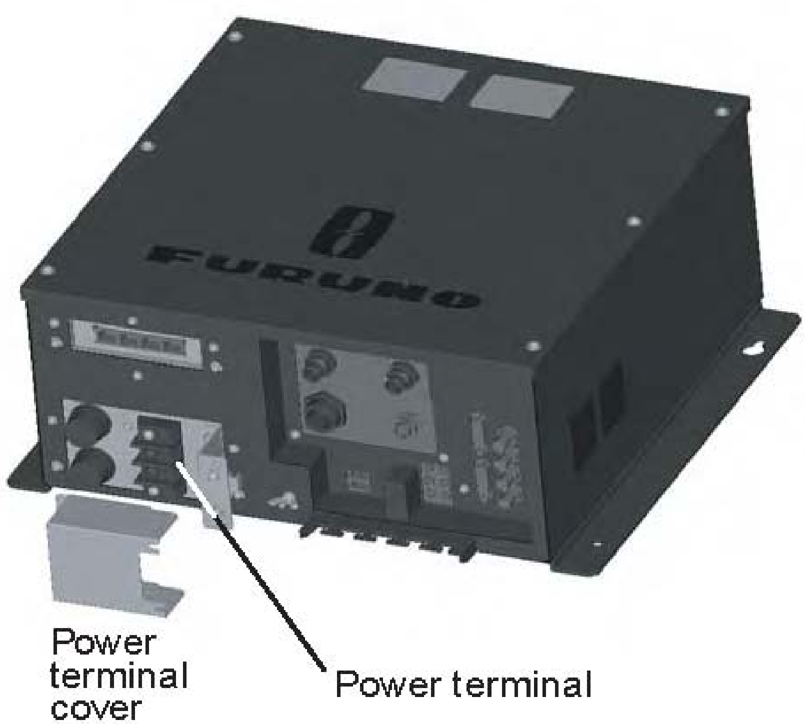
The MFD8/12 can be powered directly using nominal 12V or 24V DC.
Only use the power cable supplied with the unit and connect it to the Power Connector at the rear of the unit.

2.2.2. MFDBB

The MCU001 - MFDBB processor unit can be powered using 12V or 24V.
Make the power cable as shown below.



To connect the power cable, remove the Power Terminal cover. Unfasten the four pan head screws and connect the power cable to the power terminal (upper: +, lower: -). Reattach the cover. Note that the recommended maximum cable length is 5 m.



2.3. DATA Ports (NMEA0183)

2.3.1. Overview

Every MFD8/12 and MFD BB has THREE full NMEA0183 I/O Data Ports. One is available on the DATA1 7-Pin Connector and is pin compatible with Navnet 1/vx2 DATA1 Connector. Two additional NMEA Ports are available on the DATA2 18-Pin connector.
These NMEA connections can accept a baud rate of 4800 or 38.4K. Any instrument (GPS, AIS, Smart Sensor, etc…) can be connected to any port.

Heading input to NavNet 3D will allow functions such as Radar Overlay and course stabilization (North Up, Course Up, etc.) in Radar operating modes. The NMEA 0183 heading refresh rate needs to be 100ms (or faster) in order for the Radar ARPA function to work properly. If ARPA is not used, the refresh rate of heading information can be 200ms (5 times per second) to support radar overlay on the plotter. NavNet 3D will not accept heading if the refresh rate is only set to 1 sec. NMEA0183 heading can be accepted on any NMEA port at a baud rate up to 38.4kbps. Note that changing the baud rate on any of the three NMEA0183 Data ports will affect both the receive and transmit baud rate. In other words, data sent and received must use the same baud rate for each individual data port.
Please refer to the Appendix for installation example with the Furuno Pilot or Magnetic Compass PG500R
Note: - Heading data from a NMEA2000 source/sensor will always be at the correct refresh speed for the DRS ARPA function

2.3.2. DATA 1 description

DATA1 uses a 7 Pin round plug. Usually, DATA1 will be used to directly connect a Furuno GPS GP320B (BBWGPS).

Other NMEA0183 compatible device (Compass, AIS, Sounder, Smart Sensor…) can be connected by using a 7pin connector-to-pigtail cable (P/N 000-154-028).

Wiring Information

Pin No.	Color	Function
7	Shield	Shield
6	Black	GND
5	Red	12V_OUT
4	Green	RD1-C
3	Yellow	RD1-H
2	Blue	TD1-B
1	White	TD1-A

2.3.3. DATA 2 Description

DATA2 can be used to connect additional NMEA 0183 instruments. Use the included cable assembly FRUDD-18AFFM-L180 (FUSA P/N 000-164-608). This included Pig-Tail Cable has an 18-Pin connector. DATA2 also provides additional Inputs/Outputs (Buzzer, Event …). For example, a MOB contact closure input may be connected to PIN 15 and 11*.

*Note that any MFD will interface to virtually any MOB System or Event switch (Point Save) contact closure signal using these pins.



Wiring Information

Pin No.	Color	Function	Remark (Port No.)
18	Light green	NET-C IN (0V)	NMEA 2000 Power IN. When 12V DC power is applied on these pins, the N2K port will be powered (up to 1 ampere)
17	Pink	NET-S IN (+12V IN)	
16	Purple	Shield	
15	White	BUZZER or EVENT IN	External Buzzer Output or MOB/Event Input (Contact Closure)
14	Gray	SPEED-ALARM C	Speed alarm contact. Can trigger and external alarm or device when speed reaches a setup limit
13	Yellow	SPEED-ALARM H	
12	Black/White	+12V	External buzzer power ONLY (100mA Max)
11	Black	GND	GND for Event/MOB Input
10	Blue/White	RD3-C	Port 3
9	Blue	RD3-H	
8	Green/White	TD3-B	
7	Green	TD3-A	
6	Orange/White	GND	
5	Orange	GND	
4	Brown/White	RD2-C	Port 2
3	Brown	RD2-H	
2	Red/White	TD2-B	
1	Red	TD2-A	

2.4. NMEA2000 Description and Information

2.4.1. MFD

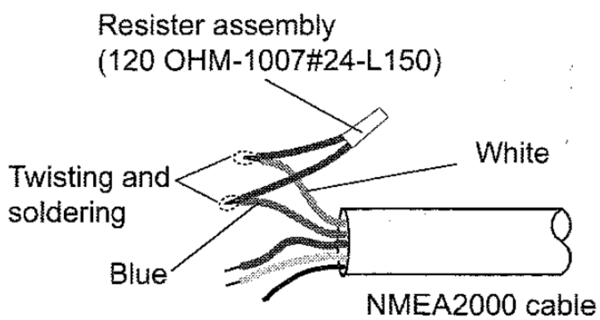
Every MFD has one NMEA2000 port (Standard “DeviceNet Micro” style connector). This port is not powered unless External Power is applied on Pin 18 and 17 of DATA2 and must be connected to a properly configured NMEA2000 network.

IMPORTANT: Each MFD is designed to connect to separate NMEA2000 Networks/Backbones! All MFD and DRS use “Ethernet Bridging” to link separate NMEA2000 networks/backbones. NEVER connect NMEA2000 ports between MFDs and/or DRS products.

2.4.2. DRS Radar

In addition to the NMEA2000 port found on the MFD processor, all DRS radar sensors have one powered NMEA2000 port (Terminal Strip connector). You may directly connect various Furuno NMEA2000 sensors to the DRS radar sensor without having to run a separate NMEA2000 cable up the mast. The total number of sensors that can be connected to the NMEA2000 DRS port without external power connection depends on power consumption. The DRS can supply up to 1 amp (20 LEN) to the DRS NMEA2000 network.

Please note that the NMEA2000 network connected to the DRS is its own independent NMEA2000 Backbone and needs to be terminated at both ends by a Terminating Resistor. A 120 Ohm resistor is standard supply with the DRS to terminate the NMEA. For example, if you install a SC30, WS200, or GP330 with the DRS NMEA2000 Port, you must have two terminators in the backbone. One can be at the sensor and the other located inside the DRS as shown below:



Please refer to the DRS Installation Guide for more information about connection

2.4.3. NMEA2000-0183 Data Conversion and NMEA2000 Bridging

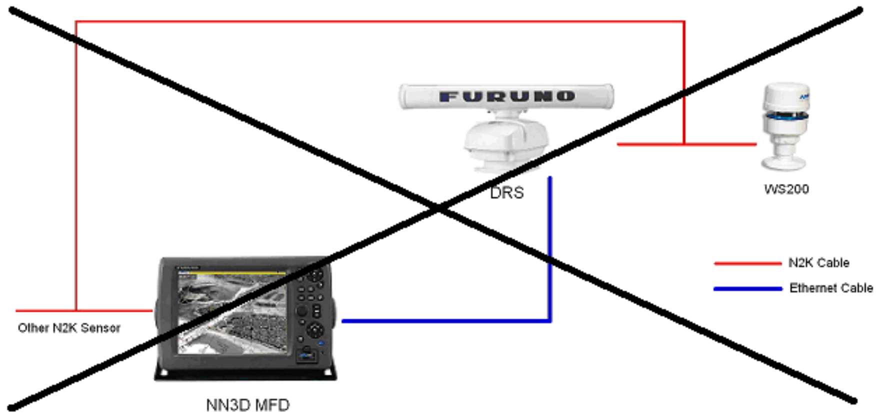
NMEA0183 to NMEA2000 conversion

NMEA0183 sentences and NMEA2000 PGNs, which are used and accepted in the MFD network can be converted and output in either/both NMEA0183/NMEA2000 formats. Note that only one type of data can be converted and output at a time (one position, one depth, one heading…). In case of multiple GPS, the position output is the one currently selected in an MFD network. This NN3D prioritizing function allows NMEA2000 products to utilize older NMEA0183 sensors and vice-versa. For example, you can connect a NMEA0183 Wind Instrument such as the Furuno PB100 to NavNet3D, and have the corresponding information output on one (or several) MFD NMEA2000 ports to feed a NMEA2000 display such as the Furuno FI50. The opposite is also true.

Ethernet Bridging of Individual NMEA2000 Networks/Backbones



You may ONLY connect one MFD or DRS to the same NMEA2000 Network. Some NN3D vessels may contain several smaller NMEA2000 Networks where data from each NMEA2000 network is linked via the High-Bandwidth NN3D Ethernet Network. In these cases, each separate NMEA2000 network will be “Bridged” together via the NN3D Ethernet Network. NN3D MFD and DRS NMEA2000 ports shall also not be connected together. In the case where NMEA2000 engine data, or other ship’s data, is introduced to the NN3D Network, the connection is made to only one MFD, and this MFD will bridge the data to other MFDs in the network.



2.5. DRS (Radar) Connection

Up to two DRS (Digital Radar Sensors) can be connected to a NavNet3D network. Every DRS comes with a supplied 15 Meter cable (FUSA P/N 000-167-636). Other cable lengths may be purchased if necessary (Note that the part numbers for the DRS25A are different):

- 10 Meter Cable (FUSA P/N 000-167-635)
- 20 Meter Cable (FUSA P/N 000-167-637)
- 30 Meter Cable (FUSA P/N 000-167-638)

The Radar cable is a “Siamese” type cable that carries power (48V) and Data (Ethernet). All MFD have a dedicated Power Port (48V) used to connect the Radar Power Cable. Some combinations require an additional Power Supply Unit (PSU) in order to provide enough power for the DRS. Please refer to the following table:

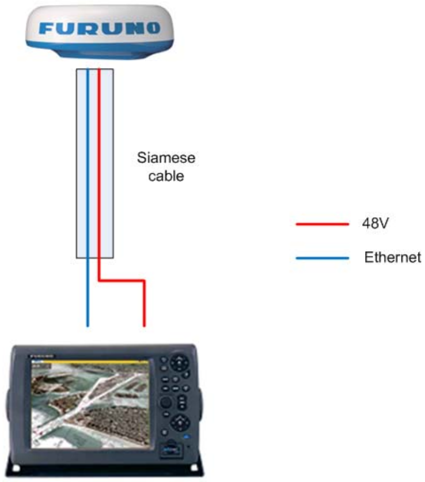
	DRS2D	**DRS4D**	**DRS4A**	**DRS6A**	**DRS12A**	**DRS25A**
MFD8			PSU-012	PSU-012	PSU-012	PSU-013
MFD12					PSU-012	PSU-013
MFDBB						PSU-013

<u>Note:</u> *DRS25A antenna includes PSU-013 as standard supply*

2.5.1. Connecting the DRS to MFD8/12

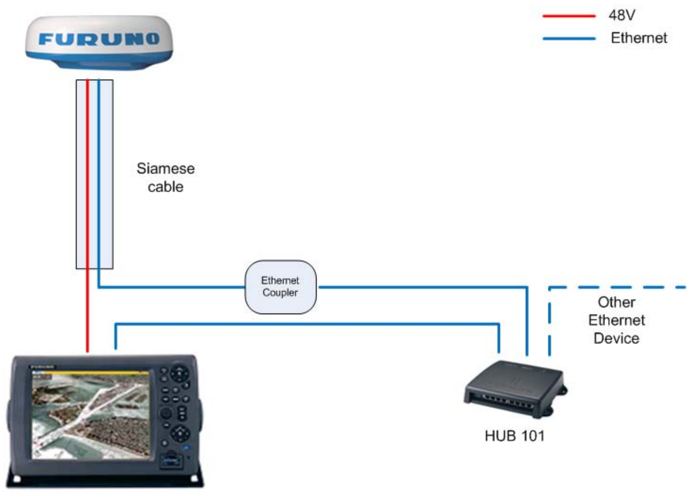
Standalone Installation:

When the MFD8/12 and the Radar are the only Ethernet sensors, you can connect the Radar Ethernet connection directly to the back of the MFD8/12.



Network Installation:

As soon as multiple MFD8/12 or other Ethernet sensors (i.e. DFF1 Fish Finder, BBWX1 Sirius receiver, etc.) are used, the Radar Ethernet connection must be connected to an Ethernet Hub. In this case an Ethernet coupler can be used to extend the Ethernet part of the Siamese Cable



Example of straight Ethernet Coupler (FUSA P/N= RJ4-5CN-STR):



<u>Note:</u> This Ethernet coupler is <u>not waterproof</u>.

Ethernet Cables that can be used to extend the Ethernet Radar Connection:

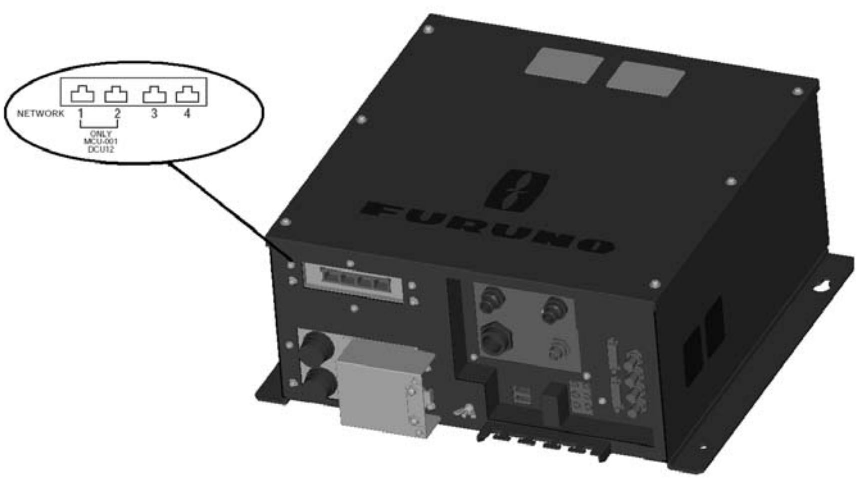
- 2 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-175)
- 5 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-176)
- 10 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-177)

Please refer to the DRS Installation Guide for more information on connections inside the antenna

2.5.1. Connecting the DRS to MFDBB

The MFDBB has an integrated HUB that allows simultaneous connection of the DRS Ethernet cable and other Ethernet devices (HUB101 for example).
<u>Note:</u> Ethernet Ports 1 and 2 are dedicated for connection of the MCU001Keyboard.

Connect the DRS Ethernet Cable to Ethernet Port 3. Ethernet Port 4 will be available to connect the HUB 101 or other Ethernet sensor



2.6. Network

2.6.1. Introduction

NavNet3D (just like NavNet1 and VX2) uses standard TCP/IP Ethernet to share radar/sounder images and other navigation information from devices connected within a networked system. In any single NavNet 3D network, a combination of up to ten NavNet3D MFDs may be connected to each other. All NavNet3D Network Components have one integrated regular RJ45 Ethernet port (with the exception of the MFDBB which has an integrated hub). Legacy NavNet components such as the ETR-6/10N (FUSA P/N BBFF1) or ETR-30N (FUSA P/N BBFF3) network sounder will need to be connected using the Hub Adapter Cable 6 Pin to RJ45 (FUSA P/N = 000-144-463).

MFD8/12

The MFD8/12 has one Waterproof Ethernet Port on the rear of the unit. It comes with standard supply of a 3 meter Ethernet Cable (FUSA P/N =000-164-809) terminated at one end with a Waterproof connector and at the other end with a regular RJ45.
This cable can be extended using a coupler (FUSA P/N= RJ4-5CN-STR) and a regular Ethernet Cable. Please note that the coupler is not waterproof and thus need to be installed accordingly.

MFDBB

The MFDBB Processor Unit contains an integrated hub that provides 4x Ethernet ports. Two of these ports are **exclusively dedicated** to the keyboard (control unit MCU001) connection. The MFDBB keyboard must be directly connected to one of the dedicated Ethernet ports on the BB (the MCU001 Control Unit cannot be connected to an Ethernet Hub/Switch). The Keyboard comes standard with a 5 meter Ethernet cable, but other lengths may be used:

Ethernet Cable that can be used to connect the MFDBB Keyboard:
- 2 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-175)
- 5 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-176)
- 10 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-177)

Note: The Keyboard uses the Ethernet cable for both Power and Data. Do not plug anything else beside the Keyboard in Ethernet Port 1 and Port 2 on the MFDBB. These

two ports are NOT standard POE (Power over Ethernet) and POE devices cannot be connected to these two ports.

2.6.2. Power Synchronization

A NN3D network is a system in which all components share information (navigation data, settings, points, routes, etc) with each other. Furuno developed special Power Synchronization features to allow proper network synchronization and functionality.

Sleep Mode:

The MFDs have a special “sleep mode” that allows each MFD to process data while consuming low power. NN3D MFDs can be in 3 states:

- ON: This is the regular mode of operation. The screen is ON and the user can interact with the device. The unit can process and share information on the network.

- OFF: The MFD is completely OFF and doesn’t process information. No power is consumed in this state.

- Sleep Mode: The screen is off and no user interaction is possible (except turning the unit ON with the Power Key). Even though the MFD appears off and the LCD is black, it will still process and share information with other MFDs on the network. The MFD consumes lower current in this state. Any NMEA2000/0183 and DRS sensors attached to the MFD ports will still function normally when an MFD is in Sleep Mode.

NN3D Sleep Mode Functional Description: When the first networked MFD is powered ON (using the power key), all the other networked MFD(s) automatically start in sleep mode (power synchronization). Pressing the Power key of an MFD in sleep mode will turn it ON. Pressing the power key of a networked MFD that is turned ON will put it back in Sleep Mode. Using the Power key on the last MFD turned “ON” on the network (all the others are already in Sleep mode) will turn the system (all MFDs) completely OFF.

IMPORTANT: Sleep Mode functionality requires the use of Furuno proprietary Hubs. The Internal MFDBB Hub and the optional Furuno HUB101 both provide NN3D Sleep Mode functionality. **Use of other generic Ethernet Hubs/Switches, while allowed, will not enable NN3D Sleep Mode!** Caution must also be used in that only “Two Pair” Ethernet cables may be utilized with generic hubs/switches so that the Sleep Mode signals are not short circuited by “Four Pair” Ethernet cables. Note also that enabling the Power Synchronization function in Navnet 3D is also very important for proper Data Syncrhonization and system integrity! Please refer to next paragraph for more information.

Why use the Furuno HUB (HUB101):

The Furuno HUB101 allows the Power Synchronization signal to reach the MFDs and other Power Synchronization compatible devices. Here is a list of all devices that support Power Synchronization:
- All NN3D Displays: MFD8, MFD12, MFDBB
- All NN3D Radar Power Supplies: PSU012 and PSU013
- Sounders: DFF1 and DFF3
- AIS: FA30 and FA50
- HUB101

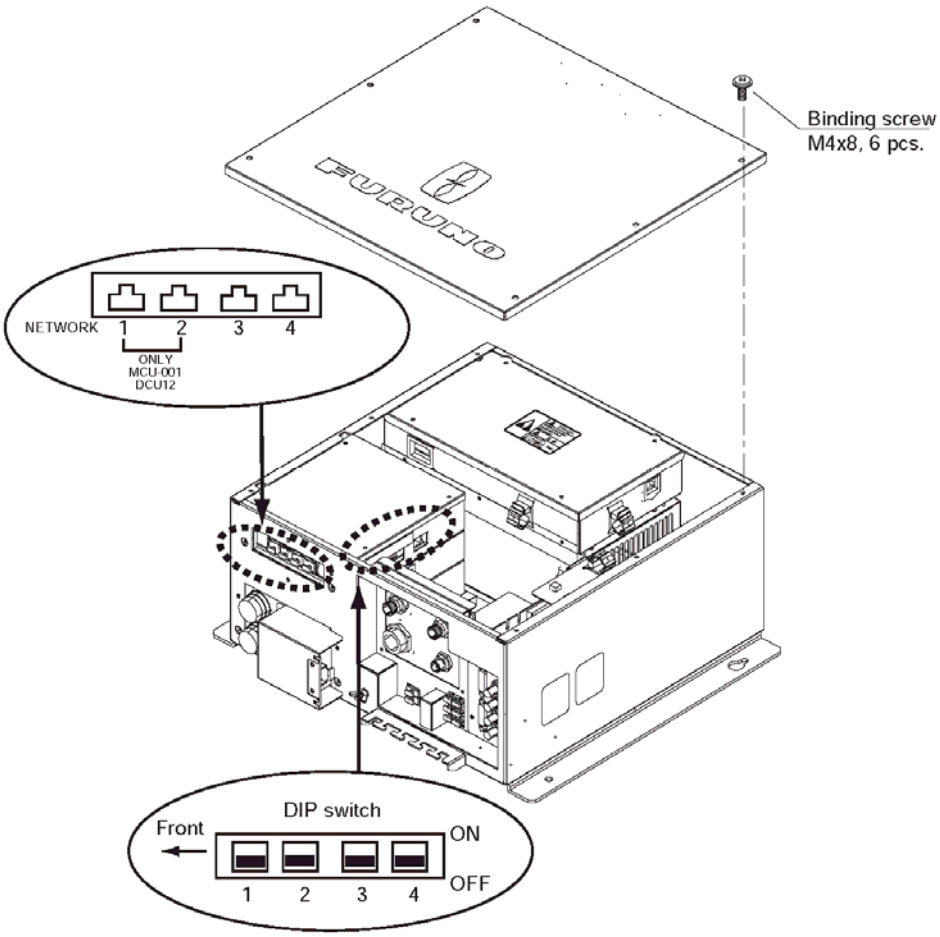
The Power Synchronization signal is transmitted using a normally unused wire of the Ethernet Cable (PIN 4 and Pin 5) thus a “4-Pair” Ethernet cable must be used to connect Power Synchronization compatible device. If a regular Ethernet switch is used instead of the Furuno HUB101, “2-Pair” Ethernet cables must be used between each MFD and the generic Ethernet Switch so that the Furuno Power Synchronization signal does not interfere with or harm the Ethernet Switch. Furuno offes a 3 meter 2 Pair Ethernet cable (FUSA P/N= 000-167-171)

In addition to allow the Power Synchronization signal to pass, the Furuno HUB101 has switch that can be set to “block” this signal thus allowing connection with non-compatible Power Synchronization devices (PC, FAR-Series Radar(Future) …). Please refer to next paragraph for more information.
The Power Synchronization feature also allows the NN3D’s unique “Data Synchronization” feature to operate properly providing redundancy and Point/Route/Track Data Synchronization between networked MFDs. Failure to enable Power Synchronization in a multiple MFD system could lead to system data loss or unintentional data updating and overwriting!

How to configure Power Synchronization:

The Furuno HUB101 has a switch for each Ethernet port that can enable/disable the Power Synchronization function. When connected to an MFD, the switch must be configured to allow Power Synchronization. When connected to any other device (PC, previous generation sensors…) the switch MUST be configured to disable the Power Synchronization to protect other devices from the Power Synchronization signal. Please refer to the Installation Guide of the HUB101 for more information.
<u>Note:</u> *A 2-Pair Ethernet cable is recommended when connecting a PC to a NavNet3D network (FUSA P/N= 000-167-171).*

The MFDBB processor unit has an Internal Hub that is compatible with Power Synchronization. DIP switches inside the processor unit can be turned ON or OFF to enable/disable the Power Synchronization feature. The number on each DIP switch corresponds to the port number.



Additionally, to allow the Power Synchronization to work, a setting in the NN3D MFD's Software "Installation Wizard" must be turned ON (see Chapter 3 for more information)

2.7. Video Inputs

NavNet3D can use regular analog video inputs (PAL or NTSC) that connect to the MFDs directly or use IP Cameras that connect directly to the network HUB. IP Cameras can be seen by all MFDs connected to the NN3D network unlike analog video that can

be viewed only on the MFD where the source is connected. Additionally some IP Camera can be controlled from NavNet3D (Pan-Tilt–Zoom ((PTZ)) IP Cameras only)

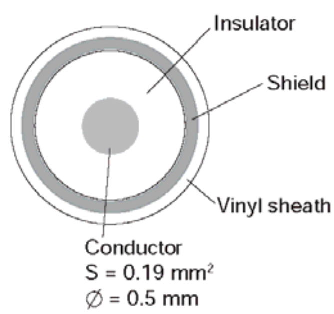
2.7.1. Analog Video

MFD8/12

The MFD8/12 units have 2 Analog Video inputs (PAL/NTSC) on 2 mm RCA (cinch) type connectors located on the rear of the display

MFDBB

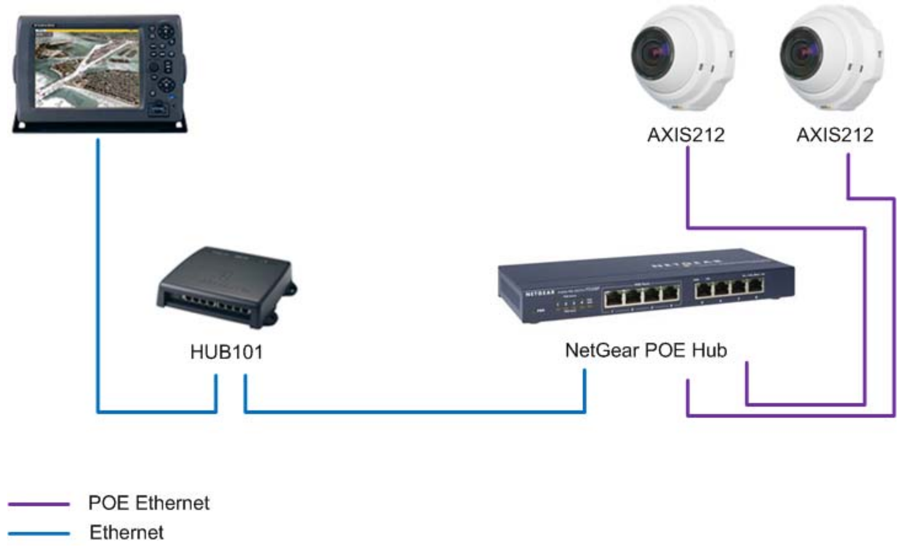
The MFDBB unit has 4 Analog Video inputs (PAL/NTSC) on BNC type connectors (75 Ohms) located on the processor unit



2.7.2. IP Camera

IP Cameras are network devices that connect directly to a HUB. Up to 4 IP Camera can be connected to one NavNet3D network. At this time, only AXIS IP Cameras (www.axis.com) that support MPEG4 Video are compatible with NN3D. Certain Axis PTZ (Pan-Tilt-Zoom) IP Cameras may also be controlled with NN3D Systems for features such as pan, tilt, and zooming. When connecting an IP Camera to the HUB101, make sure that the dip switch for Power Synchronization is set to OFF (see 2.6.2 Power Synchronization for more information)

When Power Over Ethernet (POE) AXIS IP cameras are installed (example: AXIS212PTZ) Furuno recommends utilizing a separate POE Ethernet Switch to provide power and Ethernet data to each AXIS IP Camera with a single cable. Then, utilize a non-POE port on this switch to link the IP Cameras to a HUB101 in a NN3D Network.



The IP cameras need to have a specific assigned IP address (from 172.31.200.003 through 006).

Please refer to the Appendix “How to configure the AXIS IP Camera” for more Information

2.8. External Monitors

2.8.1. MFD8/12

A DVI monitor can be connected to the MFD8/12 to repeat the screen at a remote location. The plug is DVI-D format and only a DVI monitor can be connected.
The MFD8 has a 640x480 (VGA) DVI-D output. The MFD12 has an 800x600 (SVGA) DVI-D output.

Furuno offers the following DVI cable:

- 5 Meter DVI Cable (FUSA P/N= 000-149-054)
- 10 Meter DVI Cable (FUSA P/N= CBL-DVI-10M)

Please refer to 2.10.1Waterproof Connection when Waterproof is needed

2.8.2. MFDBB

The MFDBB has two DVI-I output ports (Matched Selectable Res from 800x600 up to 1280x1024). The DVI-I output of the MFDBB will “Autosense” the monitors and allow either DVI monitors or VGA monitors to be plugged in using a “DVI-I-to-VGA adaptor. Both monitors must be the same type and resolution (VGA or DVI) when using both ports:

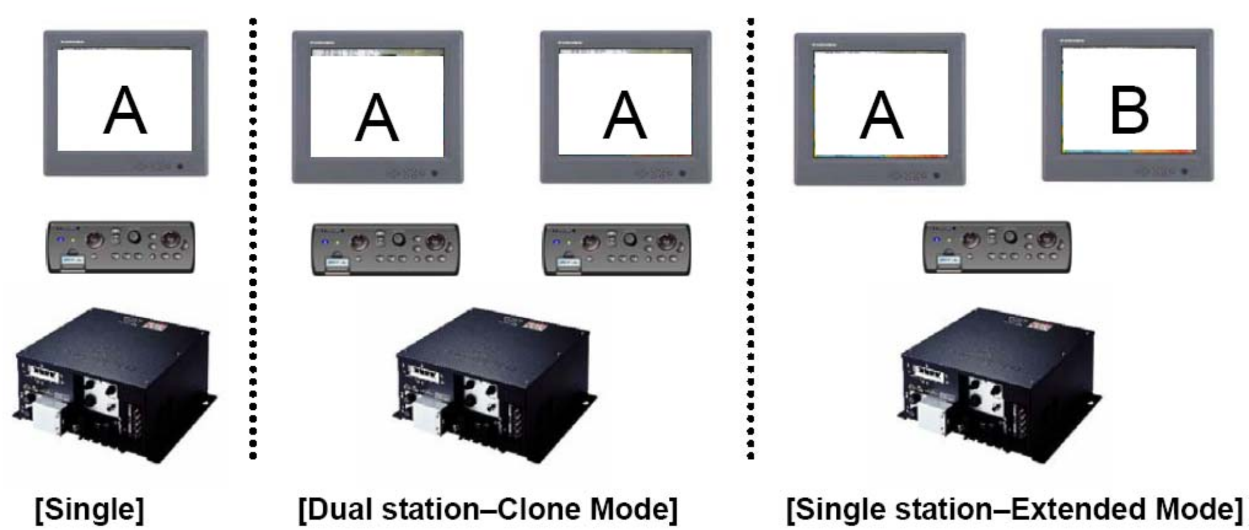


When two monitors are connected to the MFDBB, you can choose to configure the monitors either in Clone Mode or in Extended Mode.

<u>Note:</u> *When two monitors are connected to the MFDBB processor unit, they need to be capable of displaying the same resolution*

When Extended Mode is used the two screens need to be located in close proximity to each other. The two monitors show independent screen displays that can be configured independently. Only one Keyboard is used to control both monitors (the cursor will "jump" back and forth from monitor to monitor).

When the two monitors are installed for remote station configuration, dual keyboard installation from one processor requires use of the Monitor "Clone" mode (in this case both monitor will show the same picture)



Furuno offers the following DVI cable:

- 5 Meter DVI Cable (FUSA P/N= 000-149-054)
- 10 Meter DVI Cable (FUSA P/N= CBL-DVI-10M)

2.9. USB and Audio Connection

2.9.1. USB Ports

The MFD8/12 has one USB Ver. 1.0 port and the MFDBB has two USB Ver. 2.0 ports.

These USB ports are used to connect a generic USB mouse and Keyboard. Virtually any "off the shelf" USB mouse (wired or RF wireless but NOT Bluetooth) will work with NavNet3D. However, in order to utilize full RotoKey functionality, you will need a mouse that has a scroll wheel that is also "clickable" with a middle click, which will emulate selection and confirmation of a desired RotoKey function. No loading of additional

mouse software is permitted. However, the standard Mouse HID drivers will load automatically, allowing most mice and wireless mice to work fine.

Generic USB keyboards may be used to enter Name and Numerical Position. The Keyboard can also emulate the key of NavNet3D:

USB Keyboard	**Action**
ESC	CANCEL
F2	SAVE/MOB
F3	DISP
F4	MENU
F5	GAIN/TX
F6	CTRL
F7	DATA/VOL
F8	GO TO/LIST
F9	POINTS/ROUTE
F10	RANGE OUT
F11	RANGE IN
F12	SHIP/3D
Arrows (up, down, left, right)	SCROLLING PAD
Page Up	RotoKey Counter Clockwise
Page Down	RotoKey Clockwise
Enter	Push on RotoKey
End	Power/Brill

Please refer to 2.10.1Waterproof Connection when Waterproof is needed on MFD8/12

2.9.2. Audio

Audio In and Audio out are reserved for future Development

<u>Note:</u> *If Sirius Satellite Radio control and functionality is desired in the future, be sure to use the Audio Outputs on the Sirius Receiver (BBWX1) itself and not from an MFD!*

2.10. MFD8/12 Video, USB and Audio Connection

The DVI, USB, Analog Video Input and Audio In/Out ports are behind the connector cover on the rear panel. To access to the ports and connect the cables, please refer to the instructions below. Note that these connection points require an optional waterproof connector boot if necessary. These connection points are not a waterproof design without this option. Any water egress in this area will not be covered by the limited warranty.

<u>Note:</u> *The Waterproof Connector Boot is only required if the DVI, USB or Audio connections are used and waterproofing is necessary for the MFD's location.*

2.10.1. Waterproof Connection

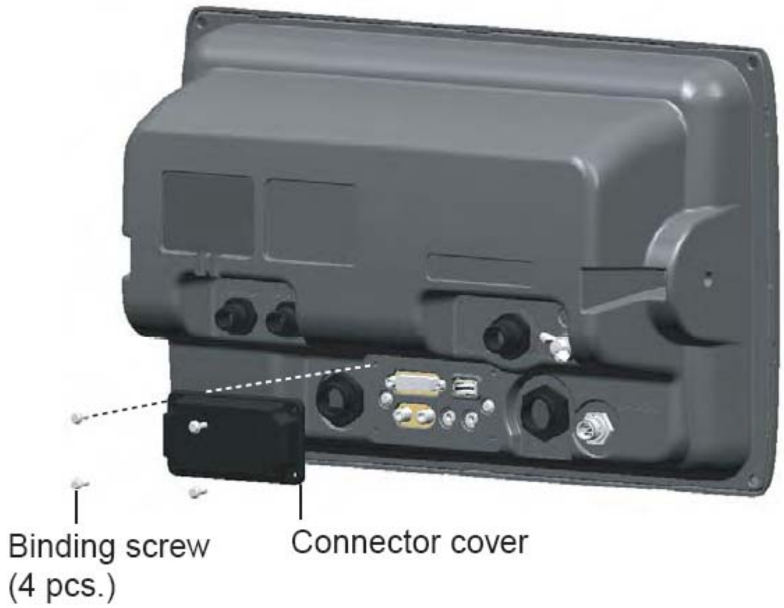
Waterproof connections for the DVI, USB, Analog Video Input and Audio I/O ports require the optional connector boot (Type: OP19-7, PN: 001-028-090).

<u>Note:</u> *This option will not be available until October 2008. Furuno apologizes if this delay causes any inconvenience with respect to installations*

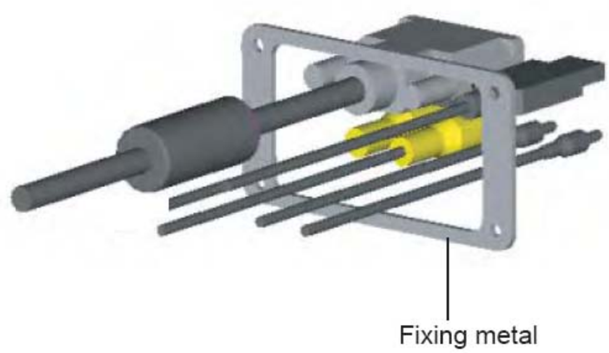
<u>Content of Waterproofing Kit</u>

Name	Type	Code No.	Qty
Boot cover	19-028-3141	100-342-642-10	1
Fixing metal	19-028-3142	100-342-650-10	1
Rubber stopper	19-028-3143	100-342-660-10	1
Cable tie	CV-150B	000-167-183-10	1
Binding screw	M3x10	000-162-662-10	4

1. Unfasten the four screws to remove the connector cover at the rear of the display unit.



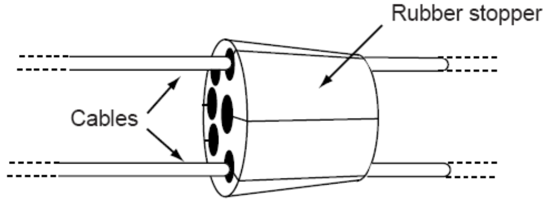
2. Pass DVI-D, VIDEO, AUDIO and/or USB cables through the fixing plate (supplied).



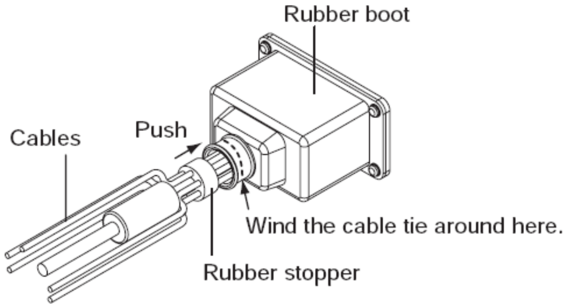
3. Attach each connector to the appropriate location at the rear of the display unit.

4. Pass cables through the slit on the boot cover.

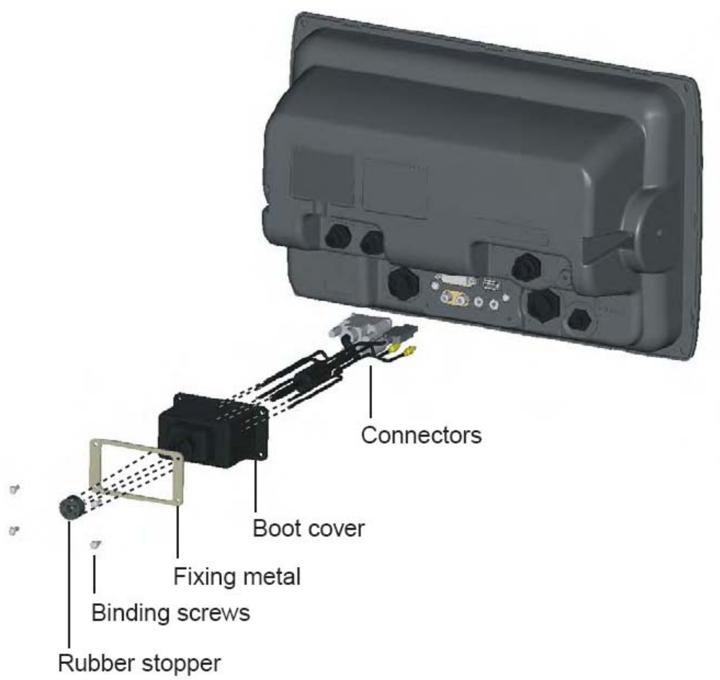
5. Install the rubber stopper to each cable. The largest hole is for the DVI-D cable.



6. Use the four plate screws (M3x10, supplied) to fasten the fixing plate and boot cover to the display unit.



7. Slide the rubber stopper into the hole of the rubber boot, and fasten the cable tie to hold the rubber boot and stopper.

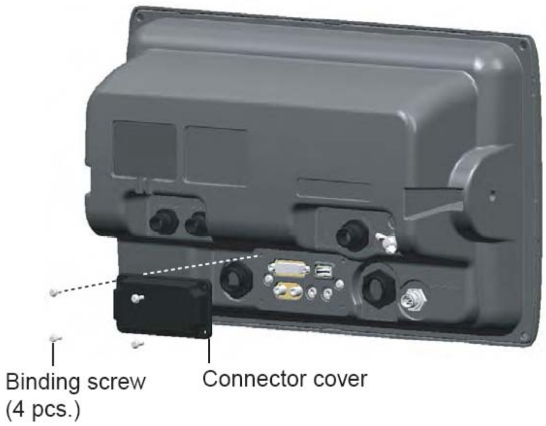


<u>Note:</u> *When only the Ethernet, Power, DRS, DATA1, DATA2 and NMEA2000 connection are used the Waterproof Connector boot is not necessary.*

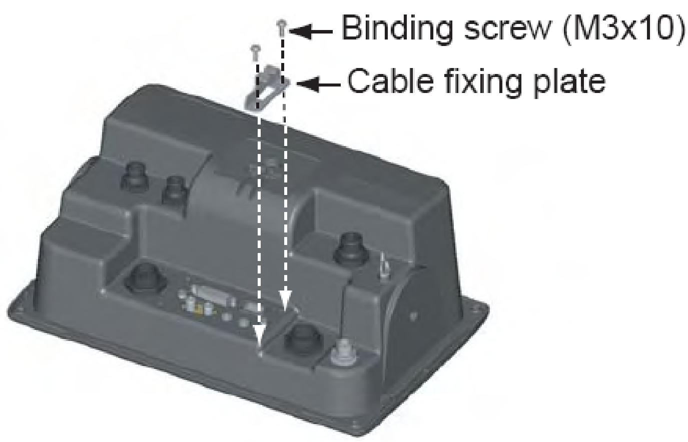
2.10.2. Non Waterproof connection

When you do not need waterproofing, use the cable fixing plate (supplied in standard installation materials).

1. Unfasten the four screws to detach the connector cover at the rear of the display unit.



2. Attach the cable fixing plate by using the binding screw (M3x10, supplied as the installation materials).



3. Attach each connector to the appropriate location at the rear of the display unit.

4. Wind the cable tie (supplied as the installation materials) to fix the cables to the cable fixing plate.

3. Configuration

3.1. Introduction

NavNet3D (just like NavNetVX2) uses Ethernet to share radar/sounder images and other navigation information from devices connected within a networked system. In any single NN3D network, a combination of up to ten NavNet3D MFDs may be connected to each other via Ethernet. All NavNet3D Network Components have an integrated regular RJ45 Ethernet port for this purpose. Legacy NavNet component such as the ETR-6/10N (FUSA P/N= BBFF1) or ETR-30N (FUSA P/N= BBFF3) network sounders will need to be connected using the Hub Adapter Cable 6Pin to RJ45 (FUSA P/N= 000-144-463).

This chapter shows you how to set up your NavNet3D system. Most of the configuration will be done using the Installation Wizard that is automatically launched during the first start or can be manually launched by pressing the [MENU] key and selecting “System” then “Installation Wizard”. Before trying to configure a NN3D system, make sure that any and all instruments are correctly interfaced. Please refer to the previous chapter (Wiring) for more information.

On the MFD8/12, the initial configuration is done using the Cursor Pad (upper pad) and the Center click (which emulate a left click mouse)



On the MFDBB, a generic **USB mouse connected to one of the USB port is required** to perform the initial configuration.

Properly designing the NavNet3D network is a key point of a successful installation (see the Appendix for Installation examples).

3.1.1. Selecting a Master

When multiple MFDs are connected in a network, one MFD (and only one) needs to be designated as the "Master". The MFD set as Master will act as a "DHCP server" and automatically performs the network configuration of all the other MFDs in the network. (The Master sets up the Hostnames, IP addresses etc…).
Note: The notion of "Master" and "Slave" is only an installation setting and is totally transparent to the end user. In other words, the MFDs set as "Slaves" do not have fewer features than the "Master". All MFDs will function and operate similarly.

When choosing the MFD that will be designated as the Master, keep this in mind:

- The Master should be the MFD that will be used primarily (be turned ON all the time when using the system)
- It is recommended (but not necessary) to have as many instruments as possible (NMEA0183, NMEA2000) connected directly to the Master.
- When MFD8/12 and MFDBB are used, the MFDBB will be more likely to be configured as the Master in a given network. (primary MFD)

Note: In a single MFD installation (only one MFD in the network), this MFD must be configured as the "Master".

3.1.2. Data Source Selection

In a network installation (and even in a standalone system), multiple sensors can provide the same information (i.e.: Sounder and Smart Sensor can both provide depth information). NavNet3D allows you to select, for each type of data (Position, Depth, Temperature, Heading…), the sensor that will be used as a primary source.
In addition, if the primary sensor fails and if another sensor providing the same information is detected on the network, NavNet3D will automatically switch to the other source after giving you an alert.

3.1.3. Installation Wizard Conceptual Description

The Installation Wizard is divided into sections (Tabs) that are targeted to configure specific aspects of the system:

“Own Setting” Tab

This Tab configures the local ports of the MFD (NMEA0183 Input/Output, NMEA2000 Output) on which the Installation Wizard is currently used.

This is also where the Master can be designated (DHCP Server turned ON)

“Global” Tab

This Tab contains configuration information that is global to the system and shared among MFDs.
This is the section where the Data Source (Sensors) can be selected to be used as primary information. You will be able to customize sensor names (ex. Assign Location Nicknames) that will help you configure the system.

This Tab will also allow you to enter vessel’s specifications (size, Motor configuration…)

Note: It is recommended to perform the Global Configuration from the MFD set up as Master

“Sounder” Tab

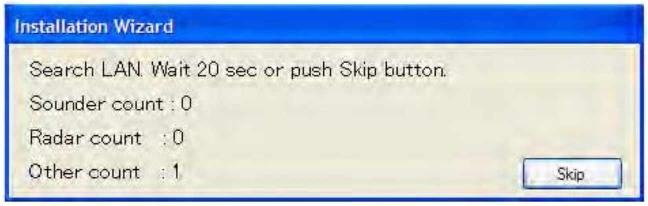
When a Network Sounder is detected, this Tab will appear and allow you to configure your sounder module. NavNet3D is compatible with the Airmar Transducer ID protocol. This feature enables compatible transducers to transmit important data to the DFF1 or DFF3, including transducer model, functions, frequency, power rating, beam pattern, impedance, ceramic element configuration and acoustic window material. Through this Transducer ID feature, the DFF1 and DFF3 Sounder Modules will automatically know the connected transducer’s precise frequency, operating power and impedance, so it can “tune” its operation to automatically adjust and optimize echo sounder performance.

“Radar” Tab

When a DRS (Radar) is detected, this Tab will appear and allow you to configure your Radar and perform the Heading Alignment adjustment.

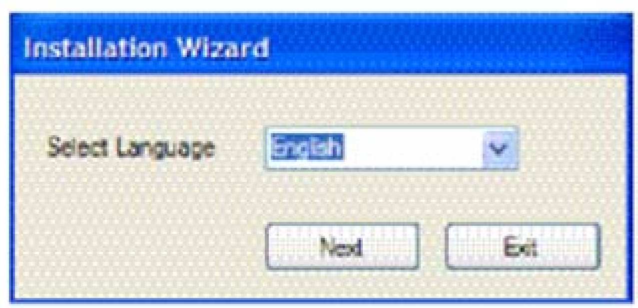
3.2. Installation Wizard Own Settings

-Press the power switch of the MFD you want to designate as Master to power it ON. After few minutes, the Installation Wizard starts.
Note: The start up time of NavNet3D will be shorter once the system is fully configured.



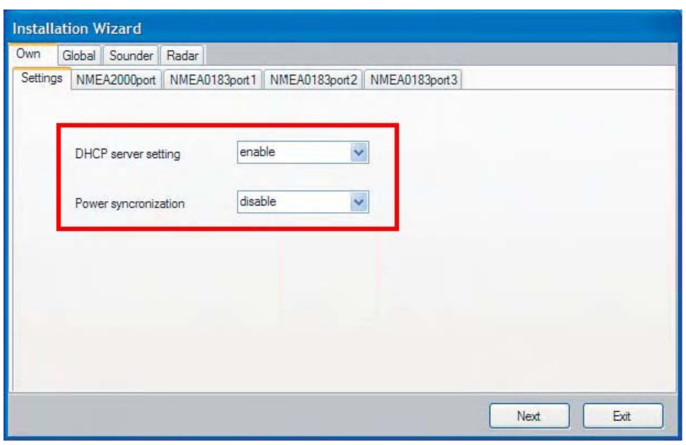
-The system will search for sensors on the network. Allow the system to fully perform the search (which takes about 30 seconds). Do not click the Skip button.

-After the detection, the language selection screen appears. The default language is English. Use the Cursor Pad and the center click (or the mouse for the MFDBB) then click on “Next:



3.2.1. Own Settings (Master, Power Synchronization, Monitor)

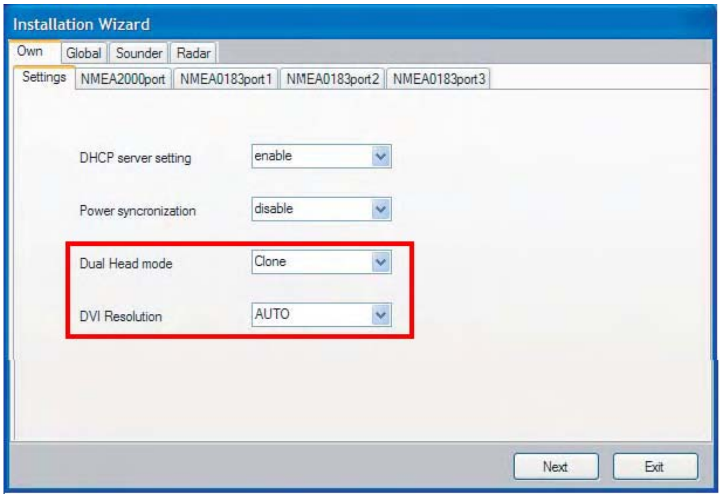
To set up an MFD as a Master, just set the “DHCP server setting” as “Enable”.
Set the “Power synchronization” to enable if you want to use this feature.



<u>Note:</u> *Power Synchronization requires a HUB101 and proper hardware configuration. Please refer to 2.6.2*

Power Synchronization *paragraph for more Information*

<u>Note:</u> *On the MFDBB, the same page allows you to select the monitor resolution and the Dual Screen mode configuration (when two monitors are used).*



Leave the DVI Resolution to "AUTO" (this default setting will work for most installation configurations).

Please refer to 2.8.2

External Monitor *for more information on Clone and Extended mode when two monitors are connected to a single MFDBB processor.*

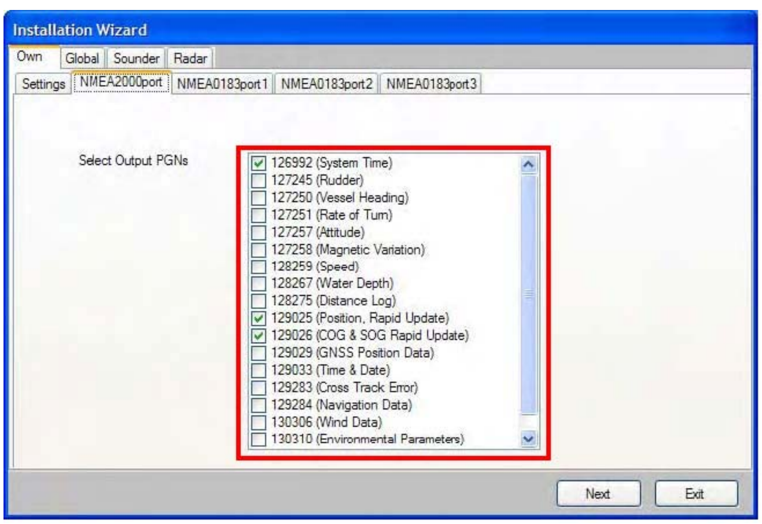
After enabling the DHCP server click on “Exit” to validate the setting.

The MFD will Power OFF automatically!

Power ON the “Master” MFD. Wait a few minutes until the Installation Wizard appears on the Master then power ON all the other MFDs in the network **and continue the Installation Wizard configuration on the Master MFD**.
Click on “Next” on the Master MFD to continue the configuration.

3.2.2. NMEA2000 Data Configuration

This page configures the information that the MFD will output on its own NMEA2000 port. The information embedded in the PGN will be the information coming from the Sensor that will be chosen as the Primary Source (see next paragraph). Enable each NMEA2000 Data PGN that will be sent through the individual MFD’s NMEA2000 port. Note that in a multi-MFD network, each MFD’s NMEA2000 backbone is separate and independent. Therefore, you may have to perform the same procedure on each MFD where external NMEA2000 displays (ie. FI-50, etc...) or sensors are connected.

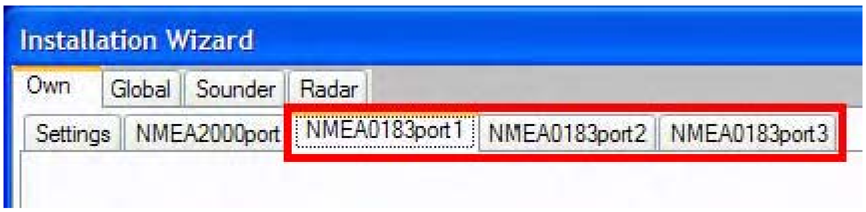


<u>Note:</u> *This setting only configures the NMEA2000 Output Data. The NMEA2000 data received (Input) at each MFD and DRS is global and automatically recognized by the network. Each NMEA2000 Data Source at each MFD will automatically appear and may be selected as a Primary System Data Source.*

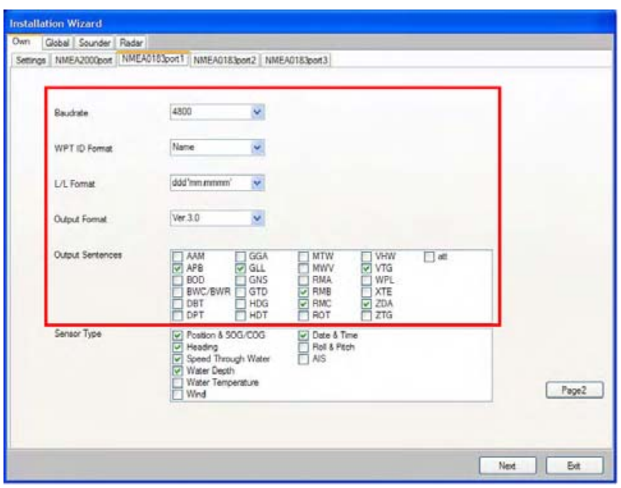
Click on the “Next” button to continue the configuration.

3.2.3. NMEA0183

The three “NMEA0183 Port” tabs are used to configure the Input and Output of the individual MFD’s own NMEA0183 ports. It is important to understand that it is not possible to filter any received NMEA0183 Data at any of these ports on individual MFDs. And unlike the automatic recognition capability with NMEA2000 Data sources, it is instead necessary to manually specify or declare the specific type of NMEA0183 sensor that is interfaced to the each NMEA0183 Input Port.



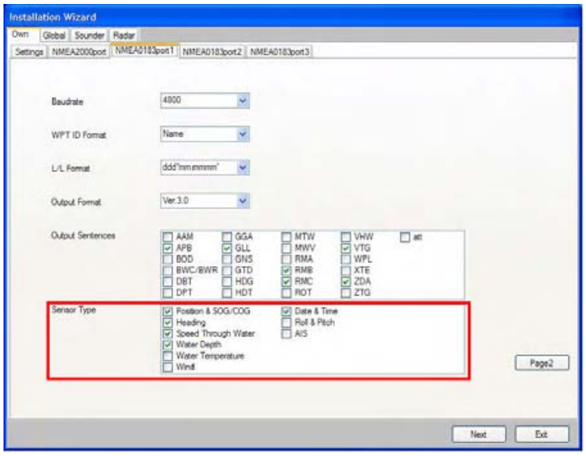
In these Tabs, you will have to configure the NMEA0183 Output Port specification (Version, Baud rate…) and the sentences needed to be output.



<u>Note:</u> “WPT ID Format” allows you to select if the name of the WPT or the WPT sequence number is transmitted to an Autopilot.
The “L/L format” dialog box, allows you to choose how many digits (seconds) to display after the decimal point in latitude and longitude of the position sentences.

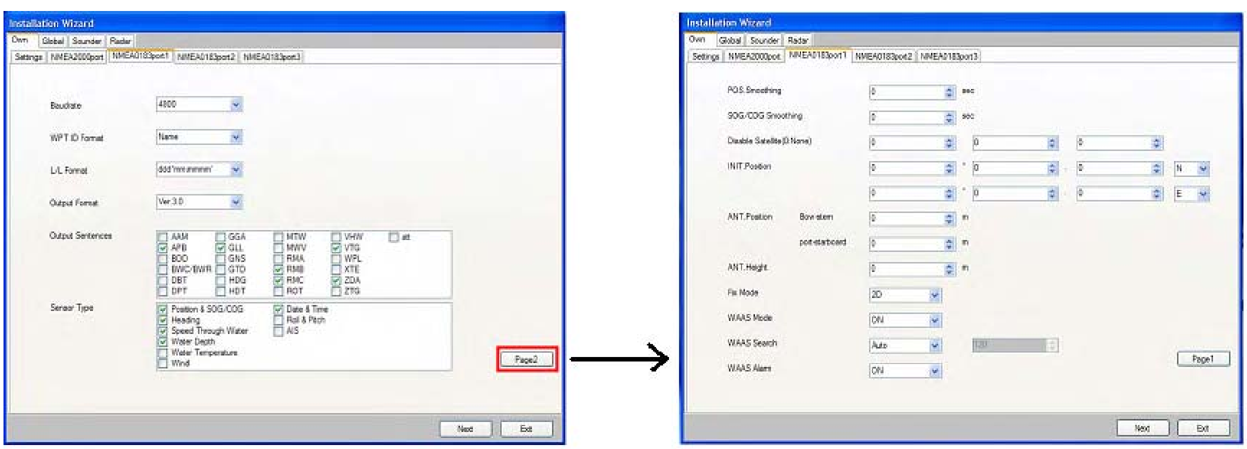
Next, you must declare the type of NMEA sensor(s) connected to the corresponding NMEA0183 Input Ports on the Master MFD. This information will be used in the Global Data Source Tab for selecting the Primary System Data Sources.

IMPORTANT!: After configuring any NMEA0183 Input Port Sensors on the Master MFD, you must REPEAT THIS PROCEDURE at any other Slave MFDs in the network where you have connected NMEA0183 Input Sensors!! If this is not done, the sensors will not be available for selection as a Primary System Data Source in the Global Settings Tab.



Example: If you connect a sensor such as a PB100 which provides Wind information but also Position, you will have to check “Position & SOG/COG” as well as “Wind”

When you connect a GP320B (FUSA P/N= BBWGPS) to NMEA Port 1, a “Page 2” automatically appears in the lower right corner of the page. Click on this button to configure advanced settings of the GP320B.



Name	Description
POS. Smoothing	When the receiving condition is unfavorable, the GPS fix may change, even if the vessel is stopped. This change can be reduced by smoothing

	the raw GPS fixes. A setting between 000 to 999 is available. The higher setting the more smoothed the raw data, however too high a setting slows response time to change in latitude and longitude. This is especially noticeable at high ship's speeds. Increase the setting if the GPS fix changes.
SOG/COG Smoothing	During position fixing, ship's velocity (speed and course) is directly measured by receiving GPS satellite signals. The raw velocity data may change randomly depending on receiving conditions and other factors. You can reduce this random variation by increasing the smoothing. Like with latitude and longitude smoothing, the higher the speed and course smoothing the more smoothed the raw data. If the setting is too high, however, the response to speed and course change slows. For no smoothing, enter all zeroes.
Disable Satellite	Every GPS satellite is broadcasting abnormal satellite number(s) in its Almanac, which contains general orbital data about all GPS satellites, including those which are malfunctioning. Using this information, the GPS receiver automatically eliminates any malfunctioning satellite from the GPS satellite schedule. However, the Almanac sometimes may not contain this information. If you hear about a malfunctioning satellite from another source, you can disable it manually. Enter satellite number (max. 3 satellites) in two digits.
INIT. Position	Set initial latitude/longitude position for cold start.
ANT. Position	Enter the GPS antenna positioning bow-stern and port-starboard position.
ANT. Height	Enter the height of the GPS antenna unit above sea surface.
Rx Mode	Choose position fixing method: 2D (three satellites in view), 2D/3D (three or four satellites in view whichever is greater).
WAAS Mode	Select ON to use the WAAS mode.
WAAS Search	WAAS satellite can be searched automatically or manually. For manual search, enter appropriate WAAS satellite number.
WAAS Alarm	When the WAAS signal is lost, the audible alarm sounds one of two ways. On: Alarm sounds continuously until the WAAS positioning mode

	is available again or the alarm is acknowledged (by key operation). Off: Alarm sounds three times.

-After completing the NMEA0183 Configuration Procedures on the Master and Slave MFDs, return to the Master MFD to complete the installation process.

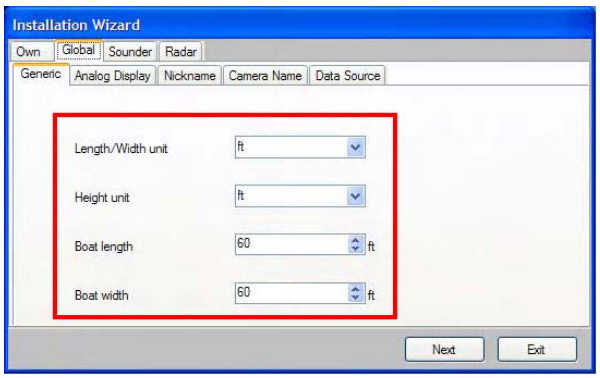
-Click “Next” at the Master MFD to continue the configuration

3.3. Installation Wizard Global Settings

Usually, the Global Settings are performed from the Master MFD in the network

3.3.1. Boat Parameter Settings

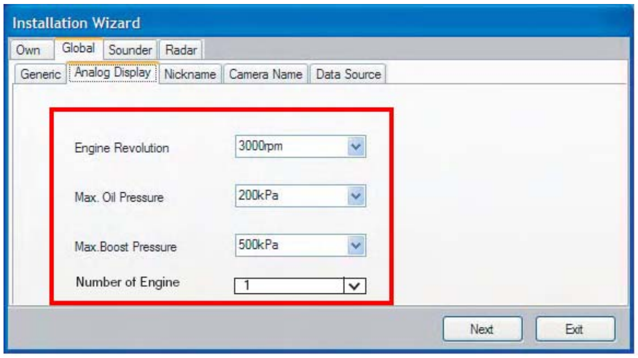
First, choose the unit you want to use to enter the boat dimension, and then enter the dimension in the appropriate fields.



Click on “Next” to continue the Analog Display tab

3.3.1. Engine Parameters (Analog Display)

When an Engine(s) with a NMEA2000 Port is connected to an MFD in the network, the Maximum Value of the RPM, Oil and Boost pressure needs to be set up in order to correctly adjust the scale of the Analog Engine Gauges.



<u>Note:</u> *The currently accepted engine data is as follows:*

- Engine Parameters (PGN 127488)

Engine Speed

Engine Boost Pressure

- Engine Parameters (PGN 127489)

Engine Oil Pressure

Engine Temp

Engine Temperature Status

Engine Warning Status

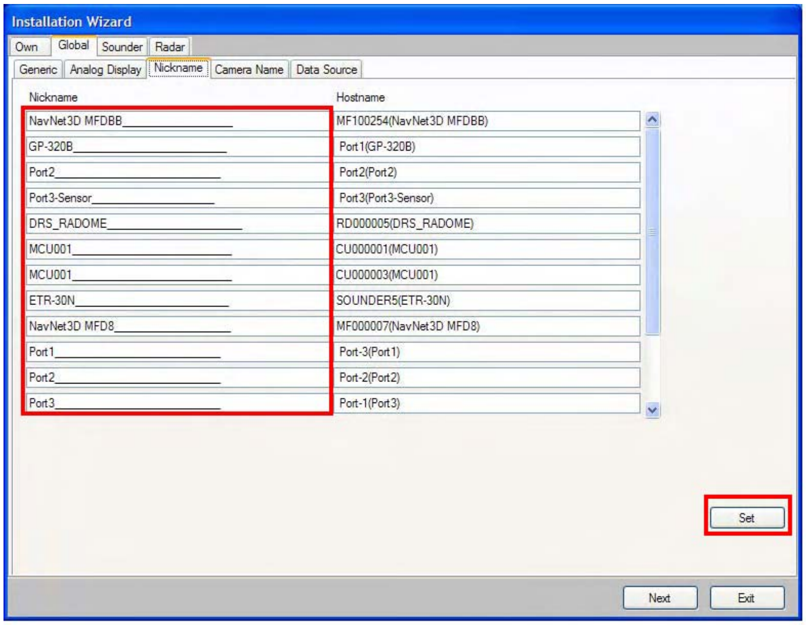
Click on “Next” to continue the configuration

3.3.2. Assigning Nicknames

You can assign Nicknames to every Ethernet Sensor, NMEA2000 instrument/sensor/display and NMEA0183 Receive Port for every MFD in a network. This will help you remember locations and assign the sensors designated as the Primary System Data Source during the next step.

<u>IMPORTANT!:</u> As explained in section 3.2.3 NMEA, if you have NMEA0183 sensors connected to the input ports of MFD(s) on the network, you first need to configure the “Own” settings for each MFD(s) before being able to assign Niccknames.

In order to enter new names, a USB keyboard needs to be used. After assigning new names on the left column, don’t forget to push the “Set” button (lower right) in order to validate the new names.



<u>Note</u>: This page will display the NMEA0183 Input Ports of every MFD connected to the network as “Port1”, “Port2” and “Port3”. Each port refers to the MFD listed just above.

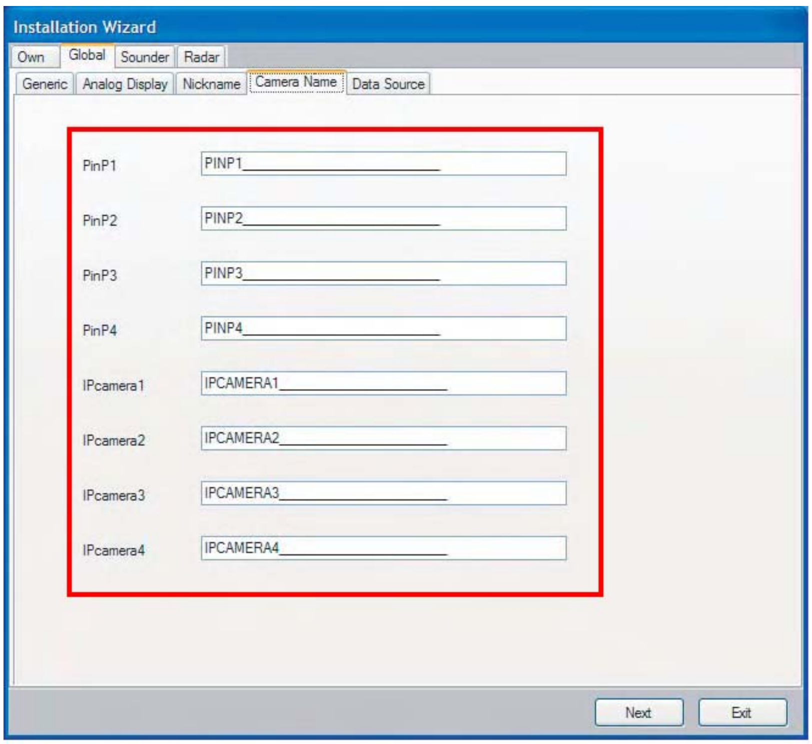
Click on “Next” to continue the configuration

3.3.3. Camera Names

You can assign names to each connected Analog and IP Camera. These names will be used by the RotoKey and for the Video ID in the main interface.

The IP Camera names are Global and only need to be configured at the Master MFD. However, the Analog cameras must be named at each MFD where they are connected.

Please refer to the Appendix "How to configure the AXIS IP Camera" for more information.



<u>Note</u>: "PnP" refers to the Analog Connection (Picture in Picture). Four PnP are available on the MFDBB and two on the MFD8/12.

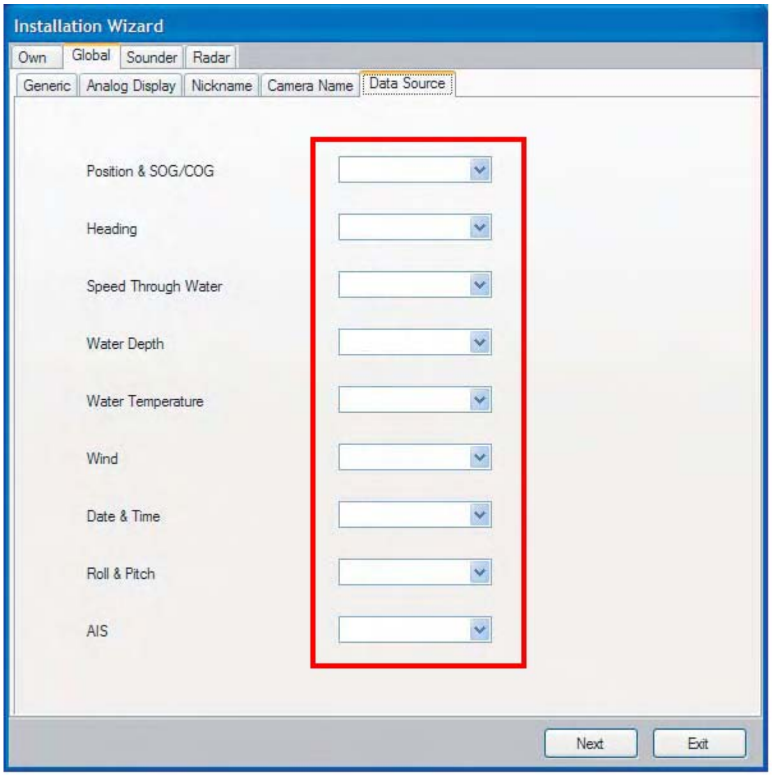
Click on "Next" to continue the configuration

3.3.4. Primary Data Source selection

<u>IMPORTANT!: </u>As explained in section 3.2.3 NMEA, if you have NMEA0183 sensors connected to the input ports of MFD(s) on the network, you first need to configure the

“Own” settings for each MFD(s) before being able to select the corresponding instruments as a data source.

Select the “Data Source” Tab. This tab allows you to select the Primary System Data Source for various data types used by the Navnet 3D Network.



Name	Description	Example
Position & SOG/COG	Choose the position-fixing sensor to use.	GP-320B, GP-330, NMEA 2000 format GPS
Heading	Choose the heading sensor to use	SC-30, SC-50, PG-500, PG-1000, Other
Speed Through Water	Choose the speed (STW) sensor to use.	Smart sensor (NMEA 0183), Speed sensor (ETR), Smart sensor (NMEA 2000), Other (NMEA 0183)

Water Depth	Choose the depth sensor to use.	Smart sensor (NMEA 0183), Speed sensor (ETR), Smart sensor (NMEA 2000), Other (NMEA 0183)
Water Temperature	Choose the temperature sensor to use.	Smart sensor (NMEA 0183), Speed sensor (ETR), Smart sensor (NMEA 2000), Other (NMEA0183)
Wind	Choose the wind sensor to use.	FI-501/502, PB-100, WS-200, PB-200, Other
Date & Time	Choose the date and time source to use.	GP-320B, GP-310B, SC-30, NMEA 2000 format GPS, Other
Roll and Pitch	Choose the motion sensor to use.	SC-30, SC-50, WS-200, PB-200, Other
AIS	Choose the AIS equipment to use	FA-150, FA-30, FA-50, Other

Note: *If a NMEA0183 Instruments does not appear as selection, make sure that the Input Type was correctly connected and assigned at each MFD. Please refer to 3.2.3 NMEA0183.*

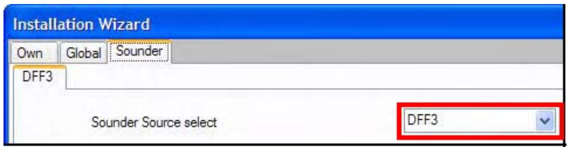
-If you don’t have any DRS (Radar) and Network sounder click on Exit to finish the installation. If you have a radar or sounder, click on “Next” to continue the configuration.

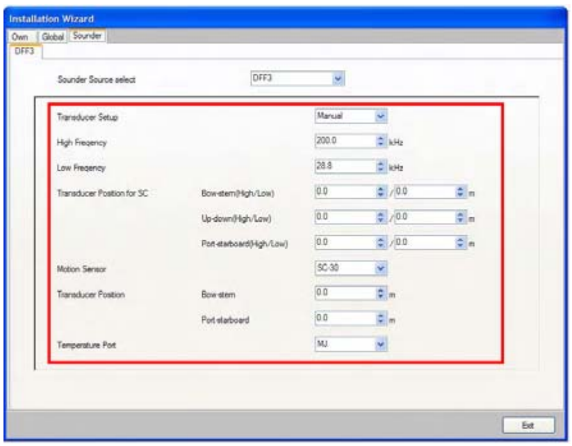
3.3.5. Sounder Configuration

Up to 2 Network sounders can be connected on the NavNet3D network.

DFF1 and DFF3

Select the Sounder Source:





a) Click the Transducer Setup pull-down menu, and choose Model Number, TD-ID or Manual, according to the transducer connected.

    Model Number: Furuno's transducer
    TD-ID: Airmar's transducer w/TD-ID
    Manual: Other Transducers

b) If Model Number is selected, click the High Frequency and Low Frequency pull-down menus, and choose the applicable model type. For TD-ID and Manual, set the high and low frequencies.

c) For DFF1, click the Power pull-down menu, and choose 1kW or 600W

d) If a Furuno satellite compass SC-30 or SC-50/110 is connected, set the distance between antenna unit (or sensor) of the satellite compass and transducer (high and low if connected) at the Transducer Position for SC pull-down menus.

    Bow-stern: Set the distance from antenna unit to the transducer in bow-stern direction. When the transducer is located on the fore side, set a positive value.

Up-down: Set the distance from the transducer to the antenna unit in the vertical direction.

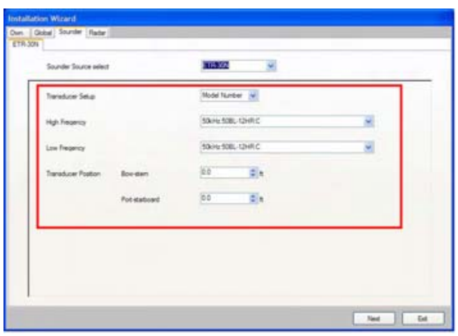
Port-starboard: Set the distance from antenna unit to the transducer in port-starboard direction. When the transducer is located on the starboard side, set a positive value.

e) Click the Motion Sensor pull-down menu, and choose SC-30 or SC-50/110 if connected.
f) Set the transducer position at the Transducer Position pull-down menus.

g) If the DFF3 is equipped with a water temperature sensor, click the Temperature Port pull-down menu, and choose the temperature source, MJ (NMEA0183 connector), High-frequency or Low-frequency.

Note: For DFF3, set the tap setting in the network sounder after setting up all the MFDs. For details, see the Operator's Manual for DFF3.

ETR 30/60 (BBFF1/3)



a) Click the Transducer Setup pull-down menu, and choose Model Number or Manual, according to the transducer connected.

   Model Number: Furuno's transducer

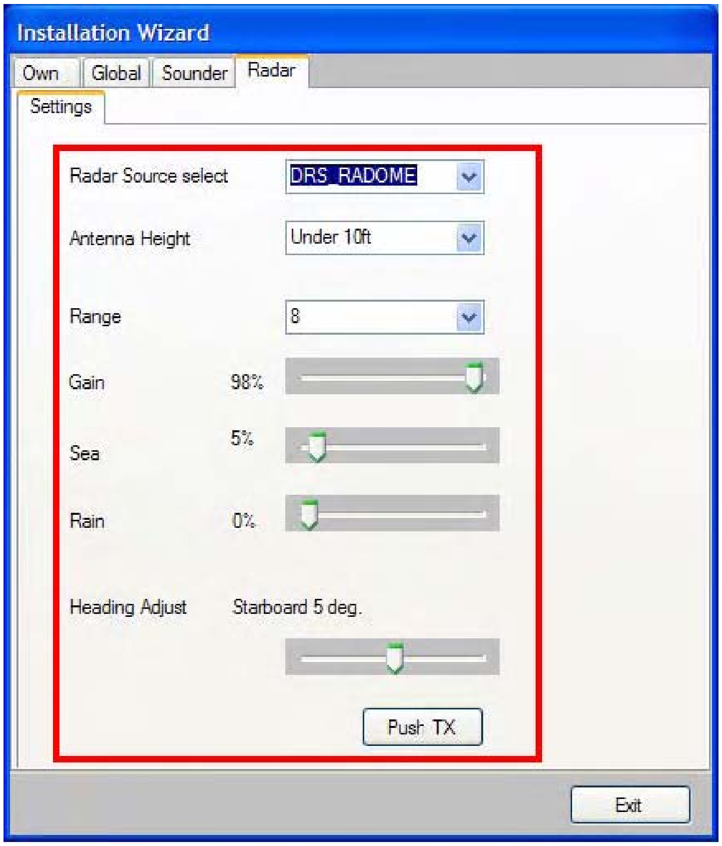
   Manual: Transducers other than Furuno
b) If you choose Model Number at step a), click the High Frequency and Low Frequency pull-down menus, and choose the applicable model type. For Manual, set the high and low frequencies with the respective pull-down menus.
c) Use the arrow buttons at Transducer Position to set transducer position.

d) If a radar sensor is connected, click the Next button to continue.

If you don't have any DRS (Radar), click on Exit to finish the installation. If you have radar, click on "Next" to continue the configuration.

3.3.6. DRS (Radar) Configuration

Up to two DRS can be connected on the NavNet3D network.



- Select the Radar Source you want to configure
- Click the Antenna Height pull-down menu, and choose the height of the antenna above the waterline, among under 10ft, 10ft-30ft or over 30ft.
- Perform the heading adjustment as follows.
- Steer towards a suitable visible target(for example, moored ship or buoy).
- Click the Range pull-down menu, and choose a range between 0.125 and 0.25 nautical miles.
- Click the Push TX button to transmit.

The radar picture appears on the right-half of the Radar dialog box.

- If necessary, adjust the gain, sea clutter and rain clutter using slider bars.
- While the vessel is pointed at the target, turn the RotoKey or drag the Slide Bar to bisect the target with the displayed line.
- As a final test, steer towards a small buoy and confirm that the buoy shows up dead ahead on the radar when it is visually dead ahead.

- Click the Push STBY button to stop the transmission.

Click on “Exit”. This will close the Installation Wizard and launch NN3D
When the Agreement appears on the display, push RotoKey to agree.

Important: *If you are using a MFDBB, the Keyboard will not work until it is properly “Linked” to a processor unit. Please refer to 3.4*

MFDBB Keyboard/Processor Linking *then continue to the next paragraph to finish the Radar Installation.*

When the MFD displays the main interface, push the [MENU] key. Use the RotoKey to scroll to the “Radar” page. Use the Cursor Pad or the mouse and click on “Radar Source” to select the DRS you want to use.
Press the [MENU] key to close the Menu then press the [DISP] key. Use the RotoKey to select a Radar screen and push to validate the selection.

Push the [GAIN/TX] key to transmit and make sure that a Radar picture appears on the screen.
As a final step, you will have to enter the “Service Man Mode” to perform the Main Bang Adjustment and the Automatic Radar Optimization procedure.

Enter Service Man Mode - Press and hold the [CTRL] key and push the [MENU] key. This will allow access to the “Service Man” advanced settings.
Use the Cursor Pad or a mouse then click on.

Radar Optimization
Click on “Radar Optimization” and wait for the confirmation window to appear.

Main Bang Adjustment
Main bang is the “black hole” which appears at the display center on short ranges. Select “MBS Adjustment” and rotate the RotoKey to suppress the main bang. After adjusting, push the RotoKey to validate.

Press the [MENU] key to close the Menu.

3.4. MFDBB Keyboard/Processor Linking

MFDBB Keyboards are Ethernet network devices that need to be assigned (linked) to a specific MFDBB processor unit during installation. A special “key-push” sequence is used to cycle through the “Linking Codes” for all the MFDBB processor unit(s).

If only one MFDBB processor unit is on the Network:

Simultaneously press and hold the Left key of the Scrolling Pad, the Right key of the Cursor pad and push the RotoKey for 5sec. (This intentionally requires two hands)



The Keyboard will beep two times. You can release the button at this time. The keyboard will now control the MFDBB.

<u>Note:</u> If this process fails, make sure that one MFD is set as Master on the network. Disconnect and reconnect the keyboard from the processor unit and try again.

If multiple MFDBB Processor Units are on the Network:

Make sure that all MFDBBs are ON and are displaying the Main Interface (or the Agreement Box). Repeat the process (as explained above) until two beeps are heard. Try to push the RotoKey and/or use the scrolling pad to see if the MFDBB you are looking to can be controlled with the current keyboard.
If the MFDBB does not respond (This means that the keyboard is actually linked to another processor unit on the network), repeat the process until the keyboard controls the correct MFDBB processor.

Repeat this process to link the other MFDBBs to their Keyboards.

4. Registering the System

4.1. SystemID Description

The Navnet 3D SystemID is a unique number assigned to a complete NN3D networked system with one or more MFDs. On the same boat, all networked MFDs have the same SystemID. This number will not change if a MFD or other NavNet Component is added to the system. The SystemID is used to identify the customer when he purchases data or services. Note that the unique SystemID will be created automatically only when the system is set-up (when all MFD are networked together and one Master is assigned).

To access the SystemID, press the [MENU] key on any MFD, turn the RotoKey to select the “My NavNet” page. The SystemID is the 20 digit number (beginning by “SI”) at the bottom of the page.

It is highly recommended to immediately write down the SystemID on the Furuno Registration Card.

4.2. Registration Card

A registration Card comes with every MFD. This Registration Card contains the Serial Number and the Registration Number that are required to correctly register the system online at www.navnet.com. Note that customers will not be able to update embedded charts or purchase additional data if the System is not properly registered online.

In order to register, the customer will need to enter the Registration Number of each MFD. It is also recommended to enter the SystemID at the time of registration

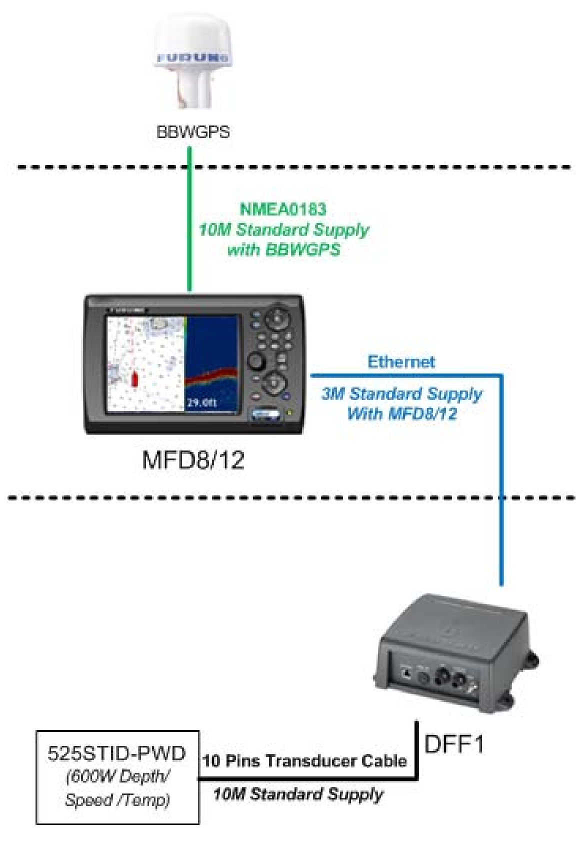
5. Appendix

5.1. Example NN3D System Configurations

5.1.1. Basic Plotter/Fish Finder Installation

The Furuno GPS (FUSA P/N BBWGPS) is directly connected to 7-Pin Port DATA1 of the MFD. The DFF1 Fish Finder (FUSA P/N DFF1) is directly connected to the Ethernet port of the MFD using the standard supply cable (3Meter). If the Ethernet connection needs to be extended, use a longer cable or add a LAN Coupler (FUSA P/N= RJ4-5CN-STR) with the following longer Ethernet Cables:

- 2 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-175)
- 5 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-176)
- 10 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-177)



5.1.2. Basic Plotter/Radar/Fish Finder Installation

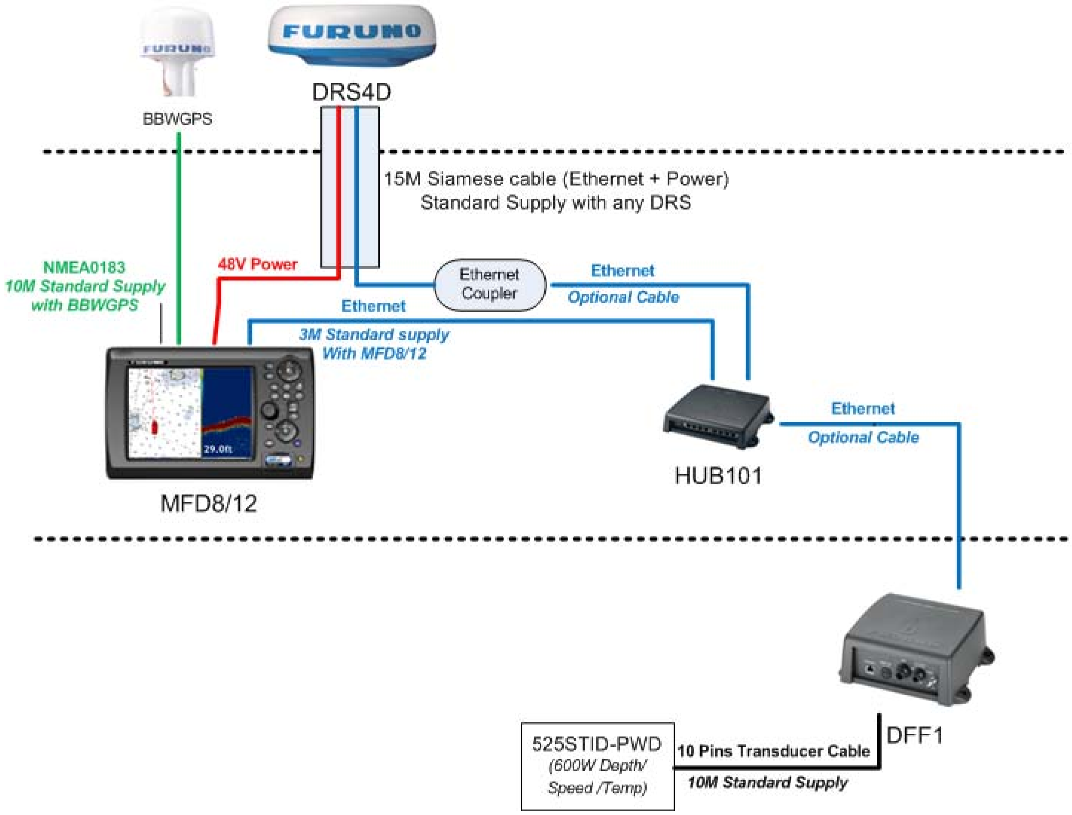
This is a single station Plotter/Radar/Fish Finder installation.
The Furuno GPS (FUSA P/N BBWGPS) is directly connected to 7-Pin Port DATA1 of the MFD. Since two Ethernet sensor are on the network (DRS Radar and Fish Finder), a network switch (FUSA P/N HUB101) is necessary. In this case the Radar Power Cable is directly connected to the back of the MFD8/12 (DRSxD (Domes) can be powered directly by any MFD. For DRSxA (Open) check compatibility). The Ethernet side of the DRS Siamese cable may be extended using a coupler (FUSA P/N= RJ4-5CN-STR) and an Ethernet cable.

Optional Ethernet Cables that can be used:

- 2 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-175)
- 5 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-176)
- 10 Meter RJ45 to RJ45 Ethernet Cable (P/N 000-167-177)

-Note that the HUB101 and all MFDs have "AUTO MDX" Ethernet Ports. This means that they will automatically adjust for straight and cross-over Ethernet cables!

-Note that this installation will not allow Radar Overlay or ARPA target acquisition. If these functions are desired, a Heading Compass sensor such as the Furuno PG500/SC30/SC50 is required (see next installation example)



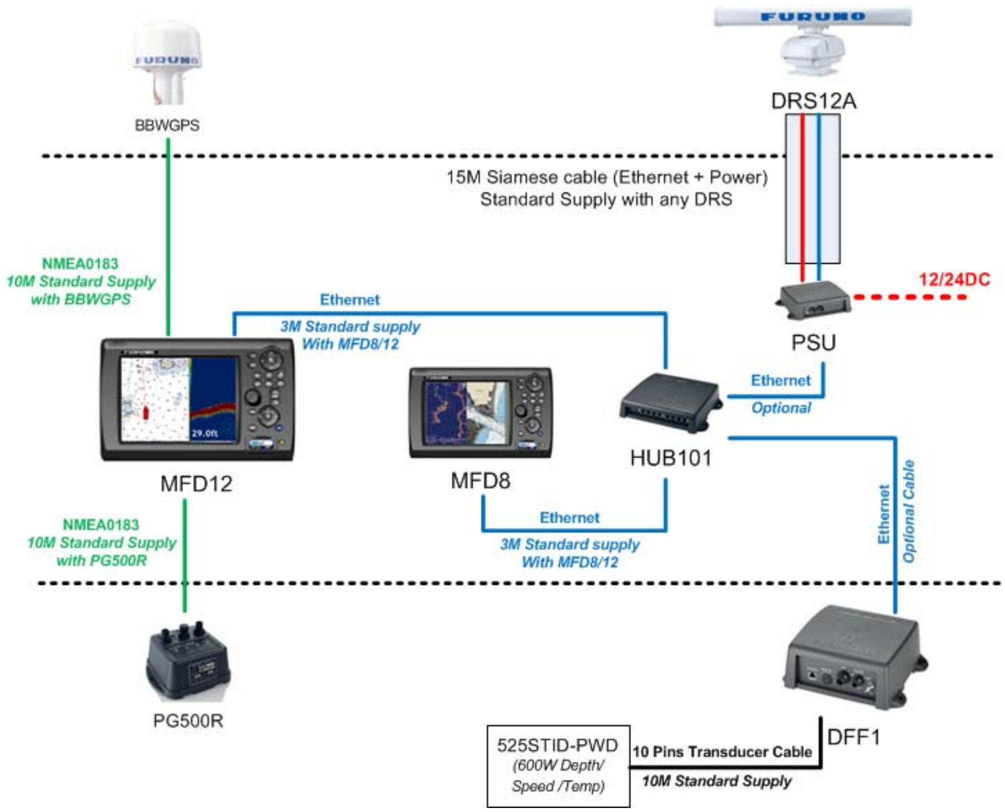
Additional Furuno Network Sensors can also be plugged directly to the HUB (using a regular Ethernet cable):

- FA30 AIS Receiver/FA50 AIS Class B Transponder
- BBWX1 Sirius Satellite Weather Receiver
- FAX30 - Weather Fax Receiver

5.1.3. Dual MFD Installation Example

This installation is a dual MFD installation with Radar Overlay and ARPA functionality (PG500 Heading Sensor included). The Furuno GPS (FUSA P/N BBWGPS) is directly connected to 7-Pin Port DATA1 of the MFD. The Furuno Heading Compass (FUSA P/N PG500) is connected to port DATA2 of the MFD.

Note that in this installation, the DRS is a 12kW "DRS12A" and therefore an optional power supply (PSU12) is required to supply power to the DRS12.



Additional sensor can also be plugged directly to the HUB (using regular Ethernet cable):

- FA30 AIS Receiver
- FA50 AIS Class B Transponder
- BBWX1 Sirius Satellite Weather Receiver
- FAX30 - Weather Fax Receiver

5.1.4. Dual Screen MFDBB Installation with Pilot Integration

Navpilot 500 Series Integration with NN3D MFDs is similar to Navnet vx2 integration. One difference is that NN3D MFDs no longer have an AD10 Heading Port. However, NN3D MFDs do require high speed NMEA0183 heading information (10Hz) for ARPA functionality.

<u>Heading Interface to MFD:</u>

To meet the High Speed Heading requirement, it is necessary to directly connect the output from the NMEA Port (Middle Connector) on the PG500 to one of the three NMEA0183 Receive Ports on a NN3D MFD. It is easy to make this connection by cutting and splicing the standard 6 pin-to-6 pin cable, that is supplied standard with the PG500, to either NMEA0183 Receive Port 2 or Port 3 on the DATA2 Cable of an MFD:

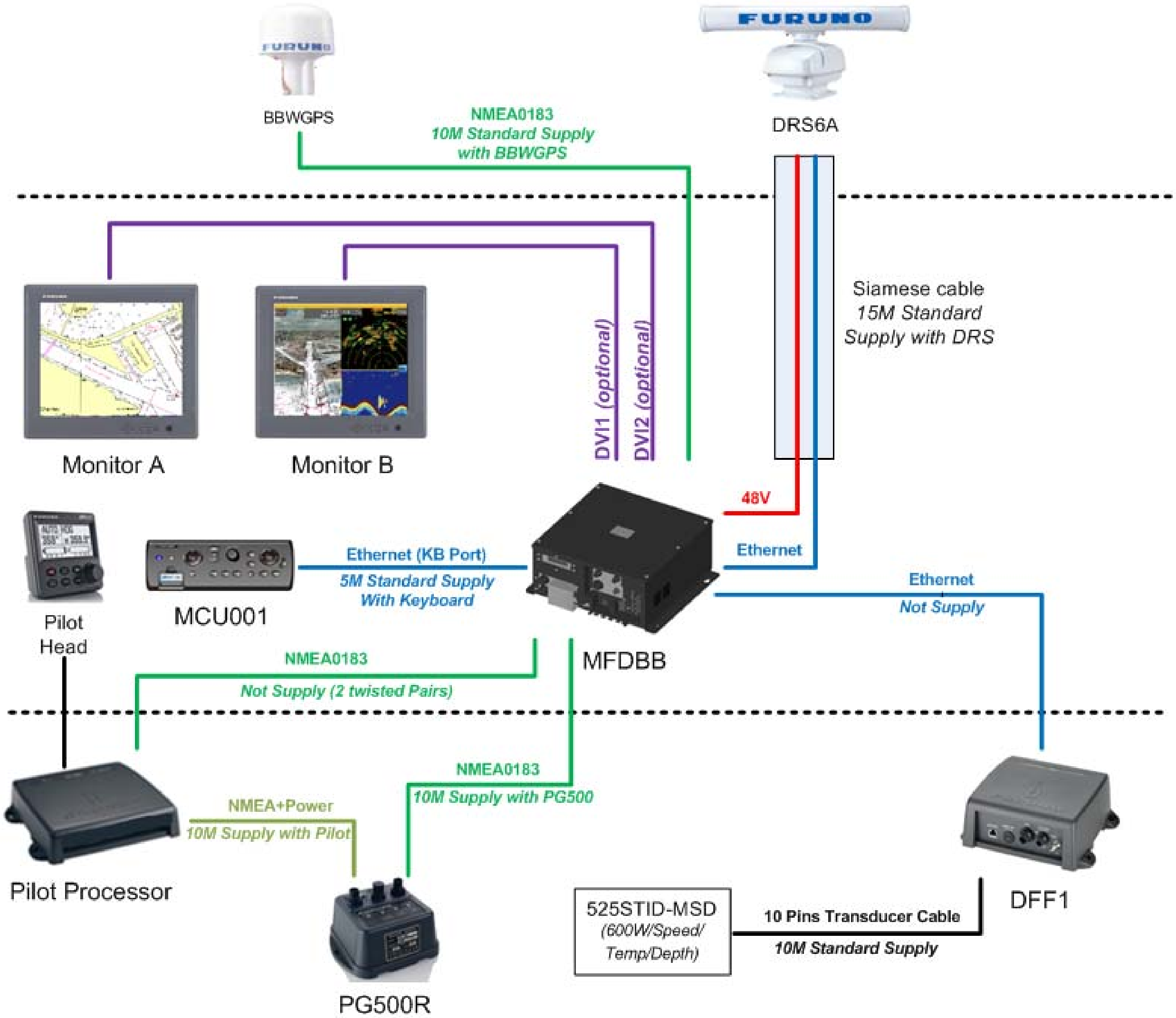
PG500	**MFD DATA2 Pig Tail (NMEA Port3)**
White	Blue
Black	Blue/White

<u>Nav Data Interface to MFD:</u>

The Nav Data connection to the Navpilot processor from one of the NMEA0183 Output Ports of the NN3D MFD is similar to that of Navnet vx2:

Navpilot Processor TB7 (NMEA In/Out)	**MFD DATA2 Pig Tail (NMEA Port2)**
Pin 1*	Brown
Pin 2*	Brown/White
Pin 3	Red
Pin 4	Red/White

**Note that this connection is only necessary if Rudder Angle Information is needed because an FI-50 series FI-506 Rudder Display is used on an MFD NMEA 2000 Backbone. In this case, make sure that ONLY the "RSA" Sentence is turned on from the software of the Navpilot System. If Rudder Angle is not needed, the receive port may alternatively be used to bring in the Heading Data from the PG500 or connection to another NMEA0183 transmitting device.*



In this example, the MFDBB is configured for Extended Mode. The two monitors show independent screen displays that can be configured independently. Only one Keyboard is used to control both monitors (the cursor will "jump" back and forth from monitor to monitor). The two screens need to be located in close proximity to each other.

Optional DVI Cables that can be used:

- 5 Meter DVI Cable (P/N 000-149-054)
- 10 Meter DVI Cable (P/N CBL-DVI-10M)

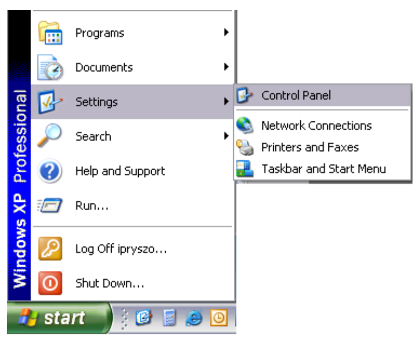
5.2. Configuring AXIS IP Cameras

5.2.1. Introduction:

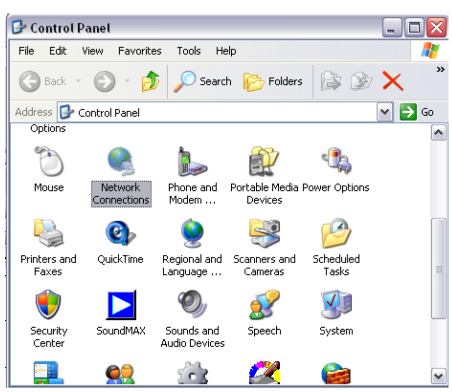
In order to view and control Axis IP Cameras from an MFD in a Navnet 3D network, it is first necessary to assign the IP Address of a MPEG-4 capable AXIS IP Camera. This procedure will require a Windows PC connected via Ethernet to the AXIS IP Camera(s). Pre-wiring and installing the cameras on the vessel first is recommended so that all AXIS IP cameras can be networked to the PC through a Hub and can be configured at the same time. It will be necessary to setup the IP Address of the PC and use the AXIS IP Utility Program (Provided with the Camera) to configure the Camera's IP Address.

5.2.2. Setting the IP of the computer

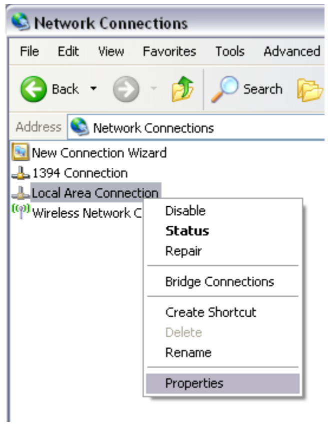
Go to "Start" and select "Control Panel"



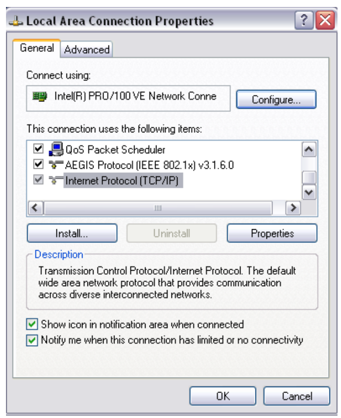
Open "Network Connections"



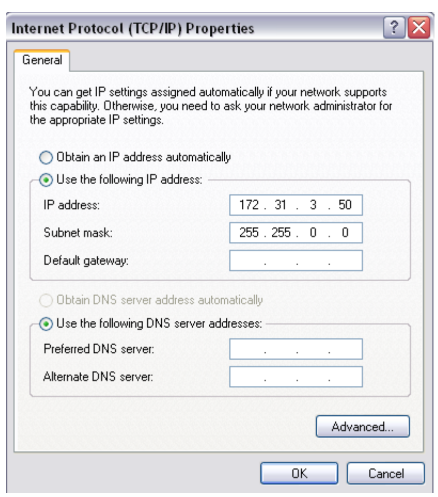
Right Click on “Local Area Connection” and select “Properties”



Select “Internet Protocol (TCP/IP)” and click on “Properties”



Fill the IP fields as shown below.



Click on OK to confirm and close the 2 windows.

<u>Note</u> that the new IP can take up to 20 seconds to be recognized. A pop-up in the lower right corner should show when the IP is correctly set. Turn OFF any Firewall that could prevent data to be exchanged between NavNet and the PC. You may also have to restart your computer.



5.2.3. Set up the IP address of the camera

To work with NavNet3D, the IP cameras need to be set up with specific IP Addresses. Up to 4 IP cameras can be connected on a network.

IP Camera number 1 = 172.031.200.003
IP Camera number 2 = 172.031.200.004
IP Camera number 3 = 172.031.200.005
IP Camera number 4 = 172.031.200.006

In this example, we will set up 3 IP cameras:

- A moving IP camera (AXIS 212PTZ) that will be configured as IP Camera 1
- A non moving IP Camera (AXIS 207) that will be configured as IP Camera 2
- A non moving IP Camera (AXIS 207) that will be configured as IP Camera 3

Load the AXIS CD "Network Video Products" that was including with the IP camera. The Autorun software should appear.

(If the autorun is not working on your computer, browse the CD and double click on "Setup")

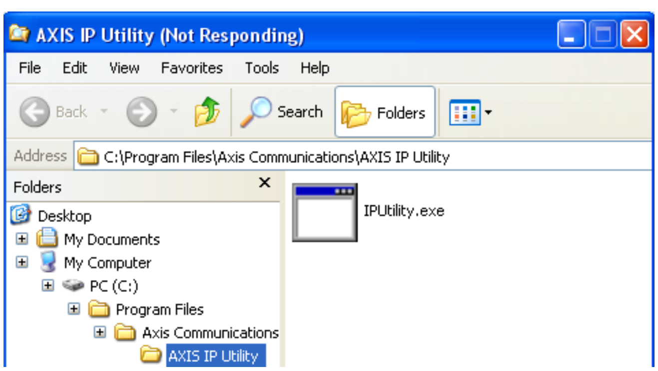
Select "Install Product"



Click on "Copy to PC"



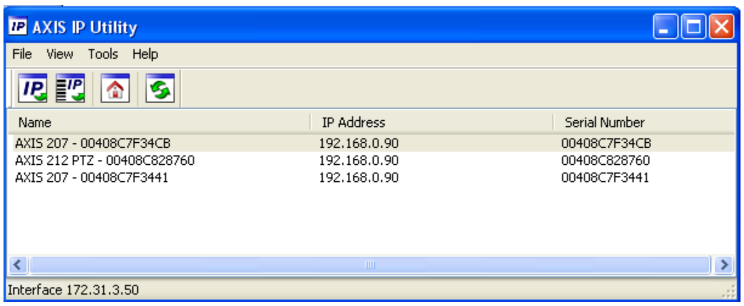
The following window should appear. Just double click on "IPUtility" to launch the configuration software



<u>Note:</u> If the Windows Firewall appears, click on "Unblock" to allow the software to configure correctly the IP Camera



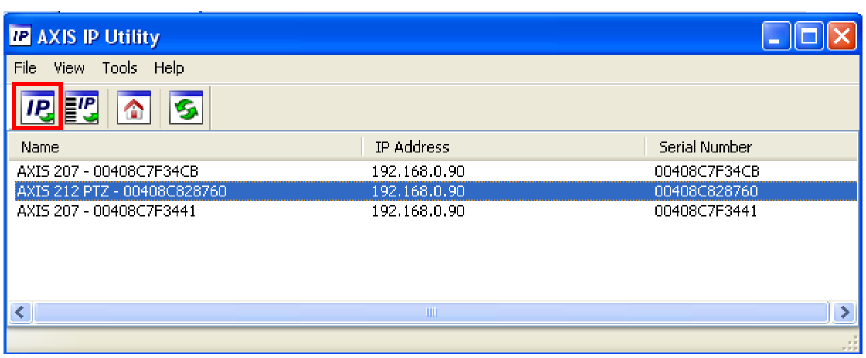
The AXIS IP utility will detect all the IP cameras connected on the network



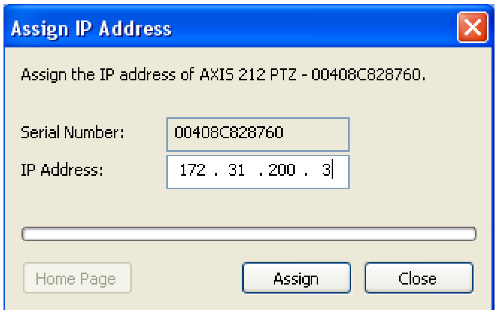
<u>Note:</u> If you use the same camera models in multiple locations, BE SURE to WRITE DOWN the IP Camera serial number (that can be found on the back of the camera) with the intended location to help correctly assign the IP camera's name.

In this example, we will assign a moving camera (212 PTZ) to IP Camera 1 (Deck), a non-moving camera with the SN ending with 34CB to IP Camera 2 (Engine Port) and a non-moving camera with the SN ending with 3441 to IP Camera 3 (Engine Starboard).

To change the IP address of the Camera, just select the camera in the list and click on the "assign new IP address to selected device" button

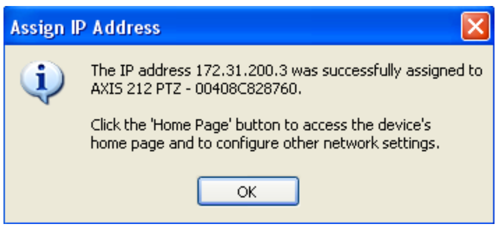


Enter the correct IP address and click on "Assign"



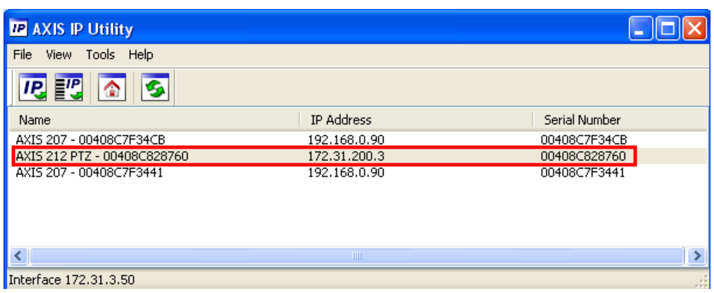
You will need to restart (power OFF and ON) the camera after the address is changed. (Just unplug and plug back the Ethernet cable if you are using the POE).

It can take a while before the confirmation box appears.

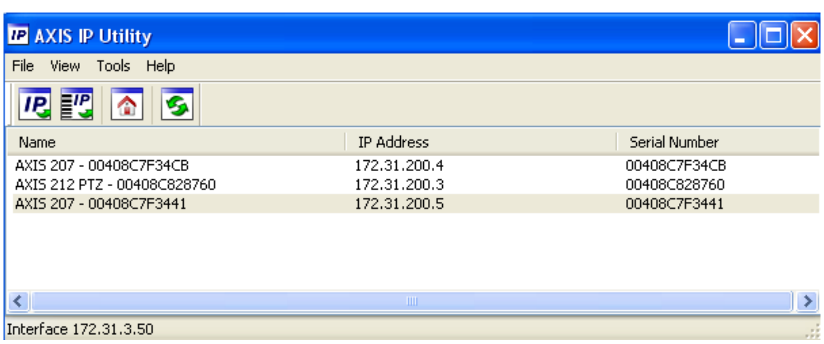


Click the “Close” button.

The first IP camera has been correctly assigned



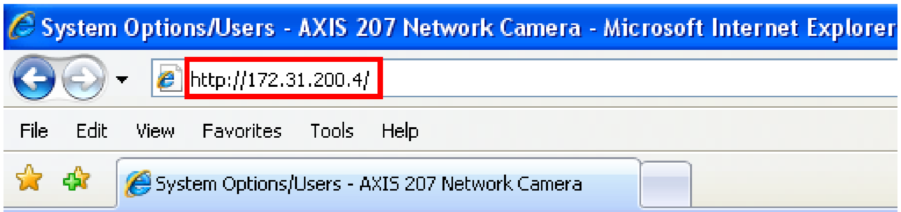
Repeat the process with the other cameras



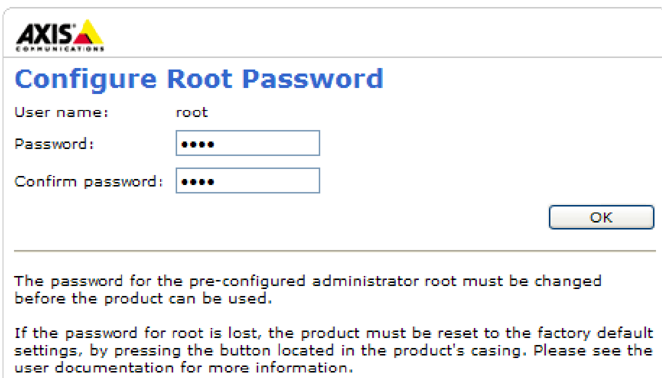
5.2.4. Configure the camera

The cameras need to be configured using a Internet Explorer.

Enter the IP address of the first IP camera:



Set the password of the IP camera to “pass” and click “OK”

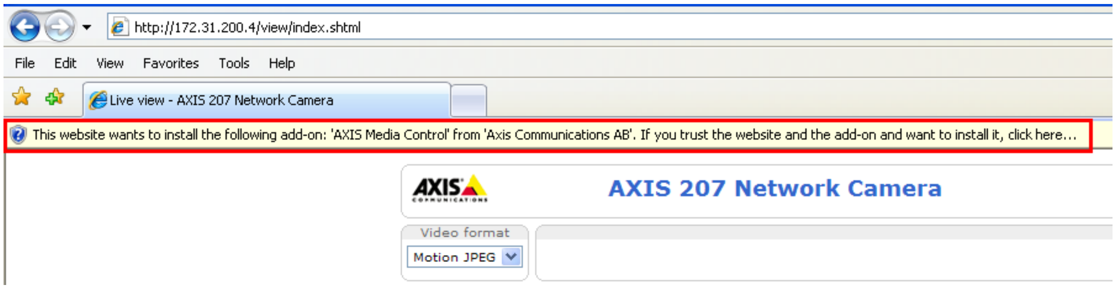


Important: You cannot use another password and must use the word “pass”.

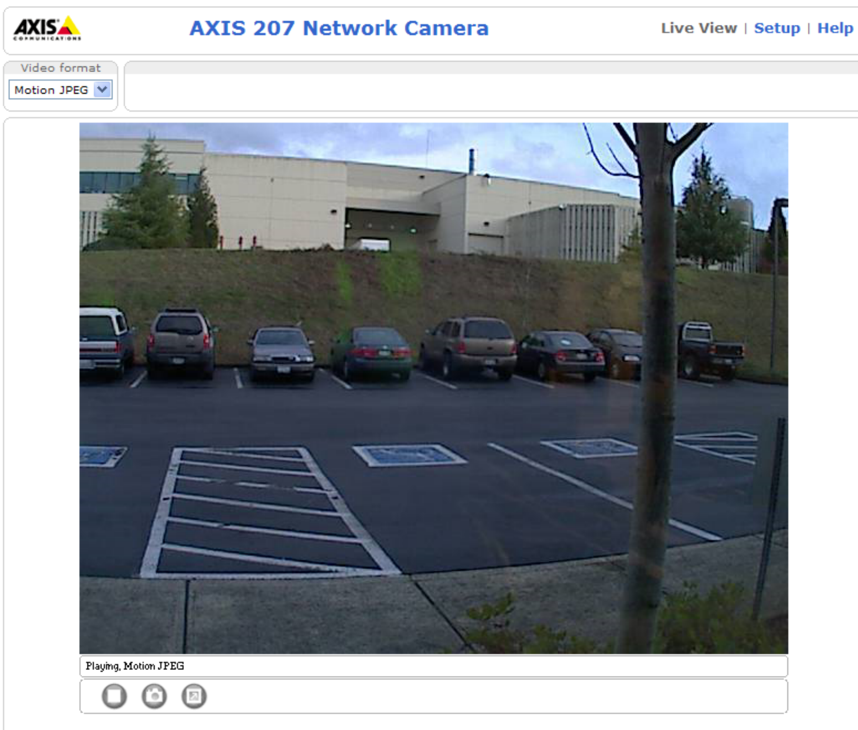
When you press OK, a dialog box asking for a login/password will appear. Just use “root” and “pass”.



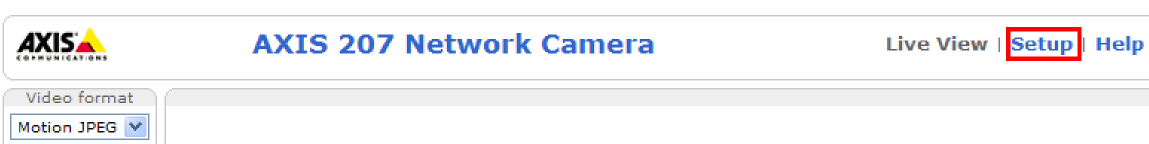
When the webpage loads, pay attention to the top of the page to authorize the installation of the ActiveX. Click on the yellow bar and choose “Install ActiveX”



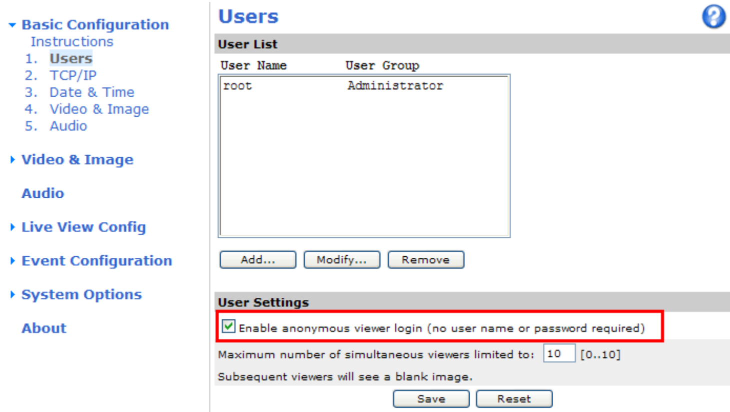
At this point a camera image should appear



Now, click on Setup



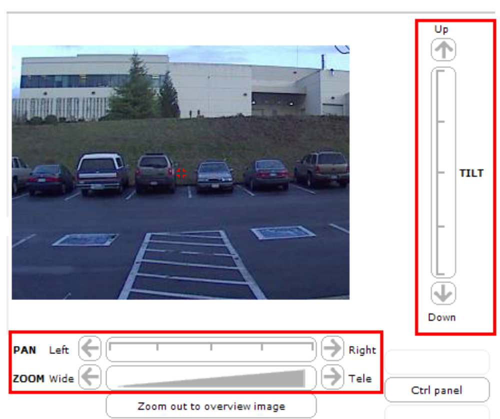
1) In “Basic Configuration -> Users” select “Enable anonymous viewer…” and click on “Save”



2) In “Basic Configuration -> Date and Time” select “Synchronize with computer time” and click on “Save”
3) In “Live View Config -> Layout” select “MPEG4” as the default video format and click on save

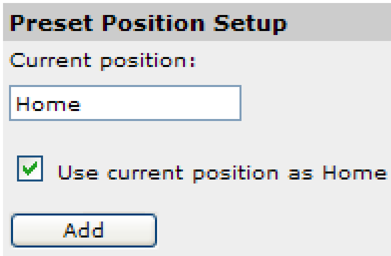


4) Optional: When using a PTZ (moving) camera, you can set-up the default “Home” position. In “PTZ configuration -> Preset Positions”, adjust the view of the default camera position using the control

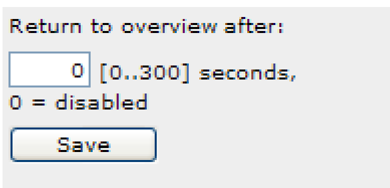


<u>Note:</u> It is recommended to zoom in on the image (Tele) to have a better “Home” preset.

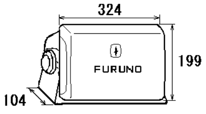
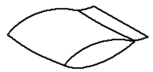
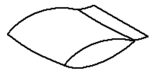
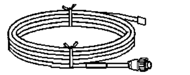
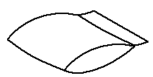
When the view is correctly set up, type “Home” for the Current position and select “Use current position as Home”. Click on “Add” to validate.



If you don’t want the camera to return to the “Home” position automatically after 30 sec, just put 0 and validate.



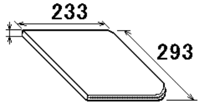
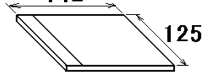
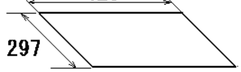
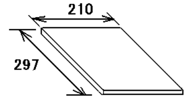
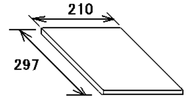
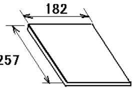
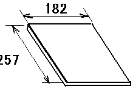
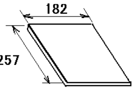
PACKING LIST MFD8-J/E

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
マルチファンクションディスプレイ MULTI FUNCTION DISPLAY		MFD8-J/E 000-011-776-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP19-00701 001-028-020-00	1
付属品 ACCESSORIES			
付属品 ACCESSORIES		FP19-01101 001-023-060-00	1
工事材料 INSTALLATION MATERIALS		CP19-00900	
ケーブル組品LAN LAN CABLE ASSEMBLY		MOD-WPAS0001-030+ 000-164-609-10	1
ケーブル組品 CABLE ASSEMBLY		FRUDD-18AFFM-L180 000-164-608-10	1
ケーブル組品MJ CABLE ASSY.		MJ-A3SPF0017-050ZC 000-157-995-10	1
工事材料 INSTALLATION MATERIALS		CP19-00901 001-028-050-00	1

1.コード番号末尾の[**]は、選択品の代表コードを表します。
CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

2.(*1)は、それぞれ仕様選択品を表します。
(*1)INDICATE SPECIFICATION SELECTIVE ITEM.

(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

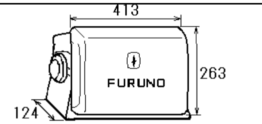
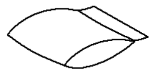
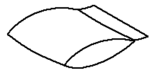
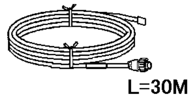
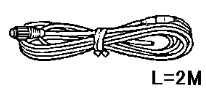
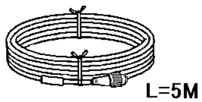
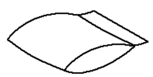
NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
図書 DOCUMENT			
書類ケース DOCUMENTS CASE		H293XW230XT18 000-168-580-10	1
取扱説明CD OPERATOR'S MANUAL CD		NAVNET3 O/M *CD-ROM* 000-167-721-1*	1
フラッシュマウント型紙 FLUSH MOUNTING TEMPLATE		C42-00709-* ワ/エイ 000-167-941-1*	1
ヒューズ変更のお願い ワ/エイ NOTIFICATION DOCUMENT		C42-00706-* 000-167-809-1*	1
装備要領書 INSTALLATION MANUAL		IM*-44440-* 000-167-806-1* **	1
操作要領書(タゲン) OPERATOR'S GUIDE		MLG-44440-* 000-167-805-1*	1 (*1)
操作要領書（和） OPERATOR'S GUIDE		OSJ-44440-* 000-167-803-1*	1 (*1)
取扱説明書 OPERATOR'S MANUAL		OM*-44441-* 000-167-814-1* **	1

3.付属品及び一部の図書は、書類ケースに収められています。
ACCESSORIES AND A PART OF THE DOCUMENTS IS PUT IN THE DOCUMENTS CASE.

型式/コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

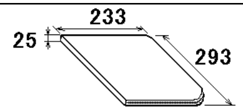
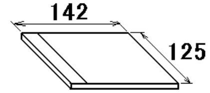
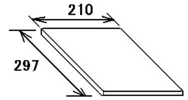
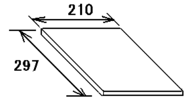
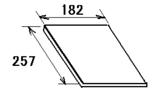
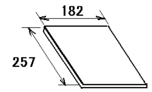
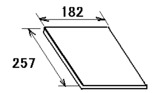
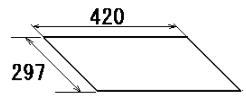
P A C K I N G L I S T MFD12-J/E

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
マルチファンクションディスプレイ MULTI FUNCTION DISPLAY		MFD12-J/E 000-011-778-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP19-00801 001-028-030-00	1
付属品 ACCESSORIES			
付属品 ACCESSORIES		FP19-01101 001-023-060-00	1
工事材料 INSTALLATION MATERIALS		CP19-01000	
ケーブル組品LAN LAN CABLE ASSEMBLY		MOD-WPAS0001-030+ 000-164-609-10	1
ケーブル組品 CABLE ASSEMBLY		FRUDD-18AFFM-L180 000-164-608-10	1
ケーブル組品MJ CABLE ASSEMBLY		MJ-A3SPF0027-050ZC 000-153-769-11	1
工事材料 INSTALLATION MATERIALS		CP19-01001 001-028-060-00	1

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（略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
図書 DOCUMENT			
書類ケース DOCUMENTS CASE		H293XW230XT18 000-168-580-10	1
取扱説明CD OPERATOR'S MANUAL CD		NAVNET3 O/M *CD-ROM* 000-167-721-1*	1
ヒューズ変更のお願い ワ/エイ NOTIFICATION DOCUMENT		C42-00706-* 000-167-809-1*	1
装備要領書 INSTALLATION MANUAL		IM*-44440-* 000-167-806-1* **	1
操作要領書(タゲン) OPERATOR'S GUIDE		MLG-44440-* 000-167-805-1*	1 (*1)
操作要領書（和） OPERATOR'S GUIDE		OSJ-44440-* 000-167-803-1*	1 (*1)
取扱説明書 OPERATOR'S MANUAL		OM*-44441-* 000-167-814-1* **	1
フラッシュマウント型紙 FLUSH MOUNTING TEMPLATE		C42-00704-* ワ/エイ 000-167-224-1*	1

3.付属品及び一部の図書は、書類ケースに収められています。
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19BA-X-9852

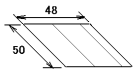
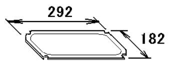
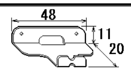
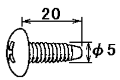
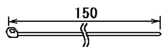
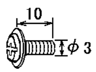
FURUNO

CODE NO.	001-028-050-00	19BA-X-9401 -2
TYPE	CP19-00901	1/1

工事材料表
INSTALLATION MATERIALS

MULTI FUNCTION DISPLAY

MFD8

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾋｭｰｽﾞﾊﾘﾏｰｸ FUSE LABEL		19-028-2231-0 CODE NO. 100-346-980-10	1	
2	Fマウントヨウスポンジ8 MOUNTING SPONGE		19-028-3122-1 CODE NO. 100-343-141-10	1	
3	ｹｰﾌﾞﾙ保持金具 CABLE FIXING PLATE		19-028-3123-2 CODE NO. 100-342-592-10	1	
4	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	4	
5	ｺﾝﾍﾞｯｸｽ CABLE TIE		CV-150B CODE NO. 000-167-183-10	1	
6	+ﾊﾞｲﾝﾄﾞ小ﾈｼﾞ BINDING HEAD SCREW		M3X10 SUS304 CODE NO. 000-162-662-10	2	

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。　なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO ELECTRIC CO ., LTD.　19BA-X-9401

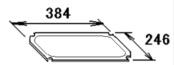
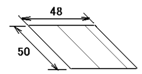
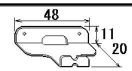
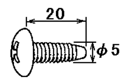
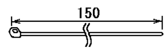
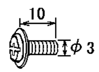
FURUNO

CODE NO.	001-028-060-00	19BA-X-9402 -2
TYPE	CP19-01001	1/1

工事材料表
INSTALLATION MATERIALS

MULTI FUNCTION DISPLAY

MFD12

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	Fﾏｳﾝﾄﾖｳｽﾎﾟﾝｼﾞ12 MOUNTING SPONGE		19-028-2062-0 CODE NO. 100-340-040-10	1	
2	ﾋｭｰｽﾞﾊﾘﾏｰｸ FUSE LABEL		19-028-2231-0 CODE NO. 100-346-980-10	1	
3	ｹｰﾌﾞﾙ保持金具 CABLE FIXING PLATE		19-028-3123-2 CODE NO. 100-342-592-10	1	
4	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	4	
5	ｺﾝﾍﾞｯｸｽ CABLE TIE		CV-150B CODE NO. 000-167-183-10	1	
6	+ﾊﾞｲﾝﾄﾞ小ﾈｼﾞ BINDING HEAD SCREW		M3X10 SUS304 CODE NO. 000-162-662-10	2	

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。　なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO ELECTRIC CO ., LTD.　19BA-X-9402

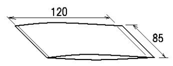
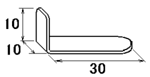
FURUNO

CODE NO.	001-023-060-00	19AY-X-9501 -1
TYPE	FP19-01101	1/1

付属品表

ACCESSORIES

MCU-001/DCU12

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	フィルタークリーナー LCD CLEANING CLOTH		02-155-1082-1 CODE NO. 100-332-651-10	1	
2	パネルリムーバー PANEL REMOVER		19-028-3124-1 CODE NO. 100-340-471-10	1	

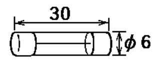
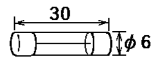
型式/コード番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。　なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO ELECTRIC CO ., LTD.　　19AY-X-9501

FURUNO

CODE NO.	001-028-020-00	19BA-X-9301 -0 1/1
TYPE	SP19-00701	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	MULTI FUNCTION DISPLAY MFD8		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	SPARE	REMARKS/CODE NO.
1	ヒューズ FUSE GLASS TUBE TYPE		FGBO-A 125V 5A PBF			2	000-155-853-10
2	ヒューズ FUSE GLASS TUBE TYPE		FGBO 125V 10A PBF			2	000-155-826-10

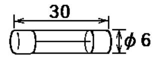
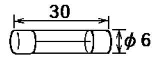
MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	19BA-X-9301	1/1

（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING　FOR REFERENCE ONLY.）
型式/コード番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。　なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

FURUNO

CODE NO.	001-028-030-00	19BA-X-9302 -1 1/1
TYPE	SP19-00801	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	MULTI FUNCTION DISPLAY MFD12		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY: WORKING: PER SET	QUANTITY: WORKING: PER VES	QUANTITY: SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE GLASS TUBE TYPE		FGB0 125V 10A PBF			2	000-155-826-10
2	ﾋｭｰｽﾞ FUSE GLASS TUBE TYPE		FGB0 125V 20A			2	000-155-780-10

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	19BA-X-9302	1/1

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

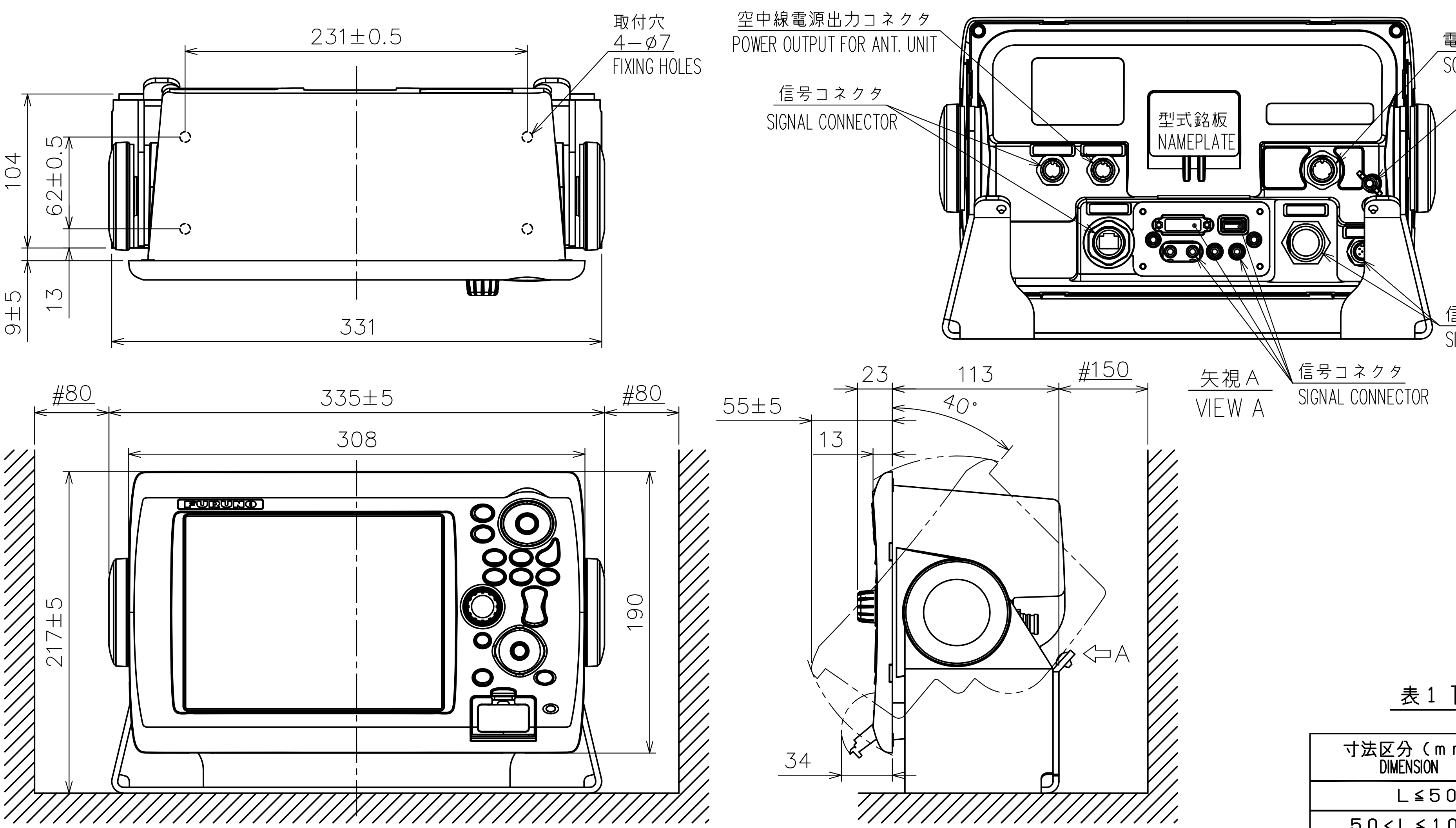


表 1 TABLE 1

寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

注　記
1）　＃印寸法は最小サービス空間寸法とする。
2）　指定外の寸法公差は表1による。
3）　取付用ネジはトラスタッピンネジ呼び径５×２０を使用のこと。

NOTE
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

DRAWN Oct. 17 '07 T.YAMASAKI		TITLE	MFD8
CHECKED Oct. 18 '07 T.TAKENO		名称	マルチファンクションディスプレイ（卓上装備）
APPROVED Oct.22'07 R.Esumi			外寸図
SCALE 1/4	MASS 4.7 ±10% kg 質量はケーブルを含まず MASS W/O CABLES	NAME	MULTI FUNCTION DISPLAY (TABLETOP MOUNT)
DWG.No. C4444-G01- A	REF.No. 19-028-310G-1		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

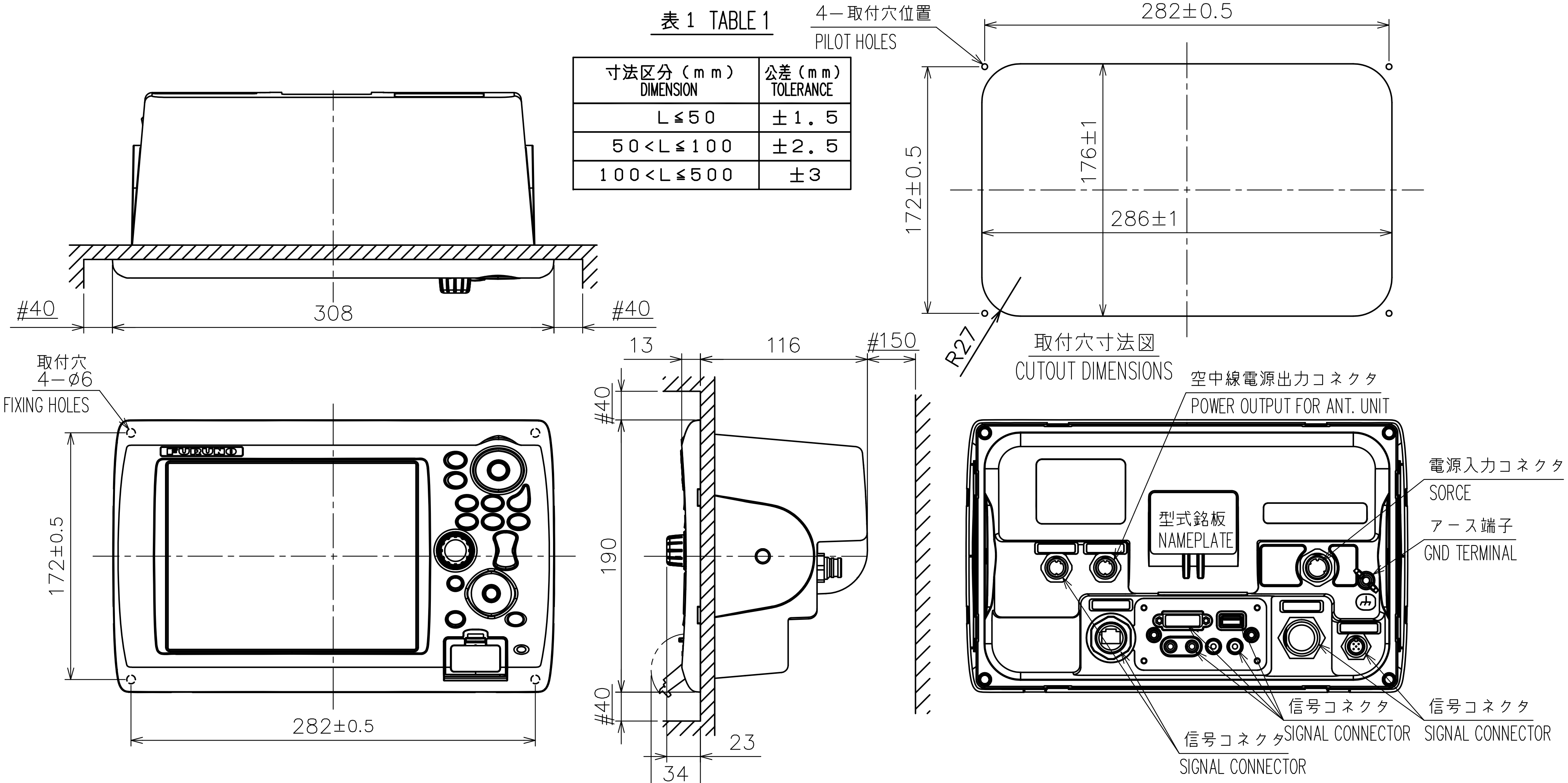


表1 TABLE 1

寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1．5
50＜L≦100	±2．5
100＜L≦500	±3

注　記
1） ＃印寸法は最小サービス空間寸法とする。
2） 指定外の寸法公差は表1による。
3） 取付用ネジはトラスタッピンネジ呼び径５×２０を使用のこと。

NOTE
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

DRAWN Oct. 17 '07 T.YAMASAKI		TITLE	MFD8
CHECKED Oct. 18 '07 T.TAKENO		名称	マルチファンクションディスプレイ（埋込装備）
APPROVED Oct.22'07 R.Esumi			外寸図
SCALE 1/4	MASS 3.9 ±10% kg 質量はケーブルを含まず MASS W/O CABLES	NAME	MULTI FUNCTION DISPLAY (FLUSH MOUNT)
DWG.No. C4444-G02- A	REF.No. 19-028-300G-1		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

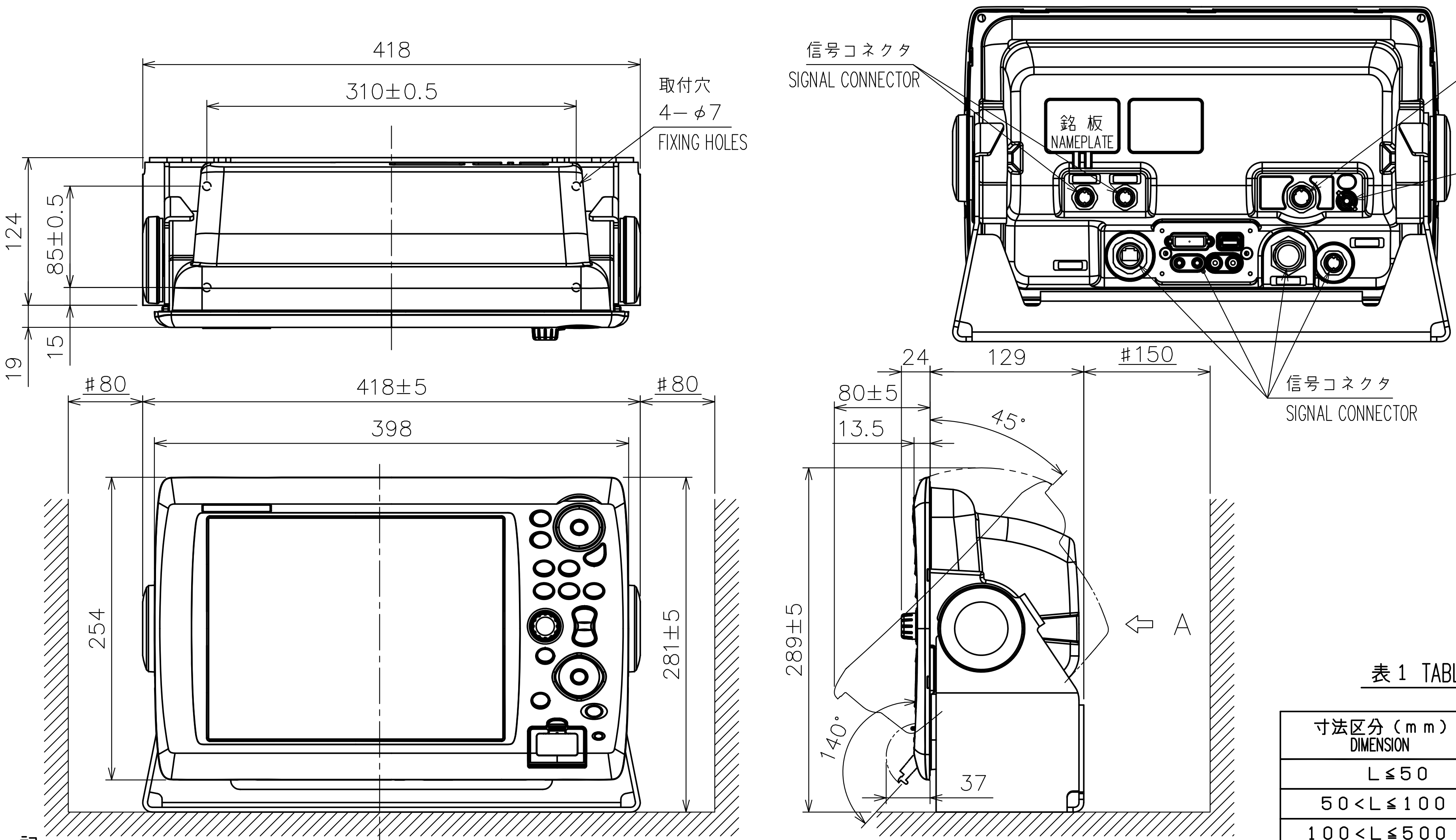


表１ TABLE 1

寸法区分（ｍｍ） DIMENSION	公差（ｍｍ） TOLERANCE
Ｌ≦５０	±１．５
５０＜Ｌ≦１００	±２．５
１００＜Ｌ≦５００	±３

注　記
１）　＃印寸法は最小サービス空間寸法とする。
２）　指定外の寸法公差は表１による。
３）　取付用ネジは＋トラスタッピンネジ呼び径５Ｘ２０を使用のこと。

NOTE
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

DRAWN	Oct. 17 '07 T.YAMASAKI	TITLE	MFD12
CHECKED	Oct. 18 '07 T.TAKENO	名称	マルチファンクションディスプレイ（卓上装備）
APPROVED	Oct.23'07 R.Esumi		外寸図
SCALE	1/5 MASS 6.8 ±10% kg 質量はケーブルを含まず MASS W/O CABLES	NAME	MULTI FUNCTION DISPLAY (TABLETOP MOUNT)
DWG.No.	C4445-G01- A REF.No. 19-028-225G-2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

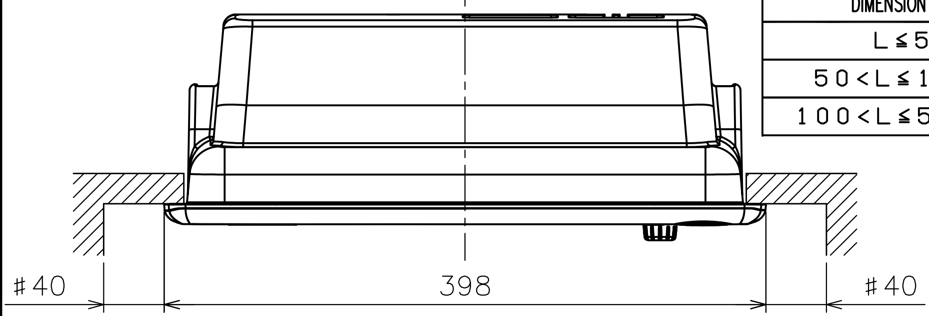
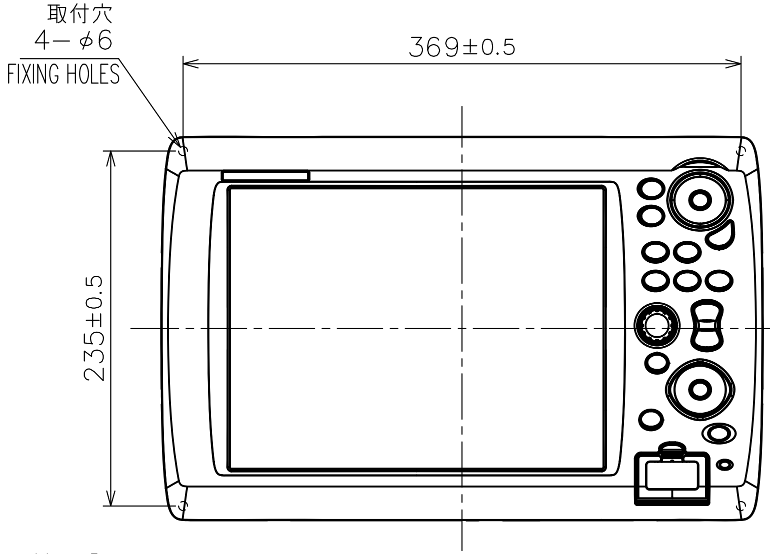
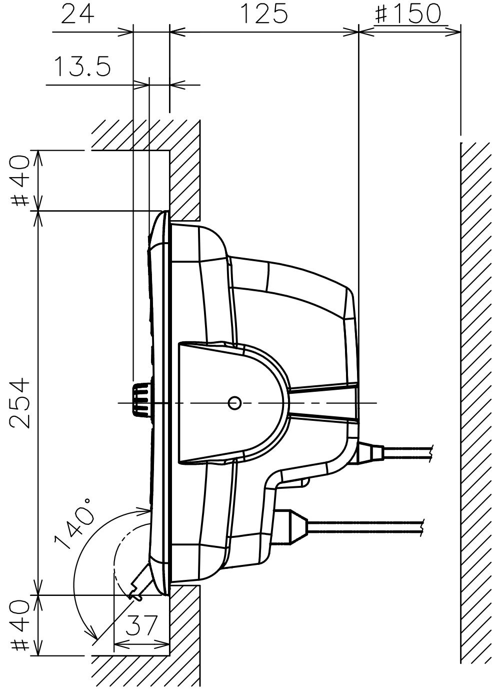
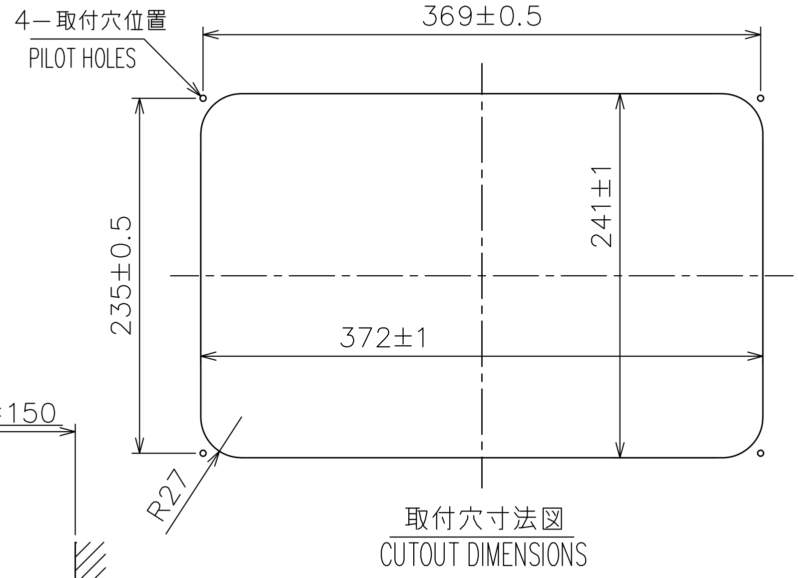


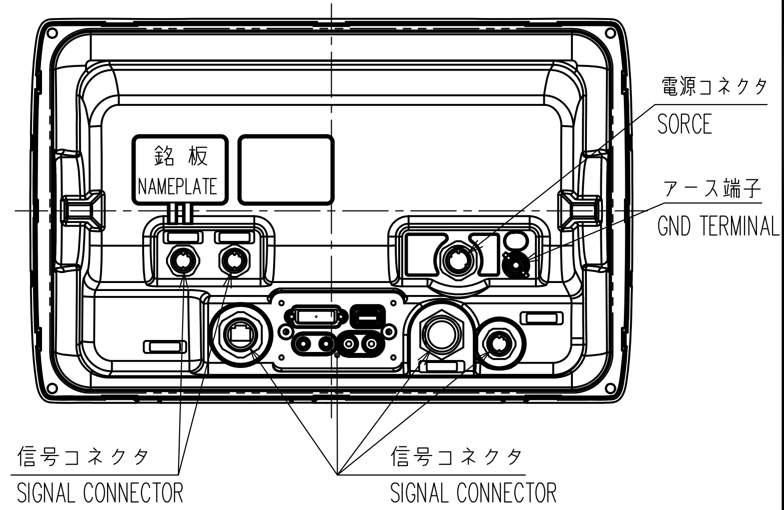
表 1 TABLE 1

寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3









注 記

1） #印寸法は最小サービス空間寸法とする。
2） 指定外の寸法公差は表1による。
3） 取付用ネジは+トラスタッピンネジ呼び径5×20を使用のこと。

NOTE

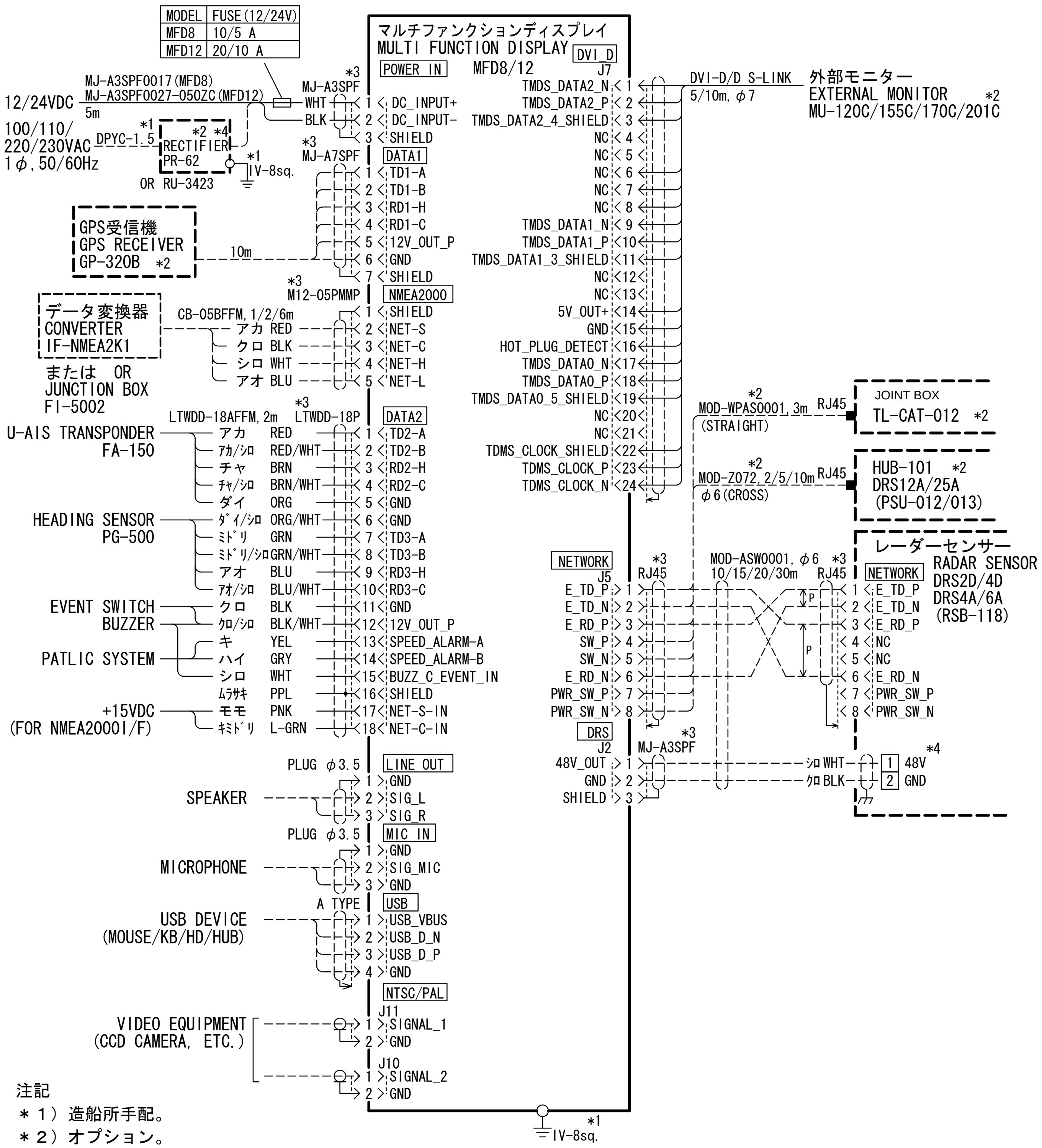
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE TAPPING SCREWS φ5x20 FOR FIXING THE UNIT.

DRAWN	Oct. 17 '07 T.YAMASAKI	TITLE	MFD12
CHECKED	Oct. 18 '07 T.TAKENO	名称	マルチファンクションディスプレイ（埋込装備）
APPROVED	Oct.23'07 R.Esumi		外寸図
SCALE	1/5 MASS 5.4 ±10% kg 質量はケーブルを含まず MASS W/O CABLES	NAME	MULTI FUNCTION DISPLAY (FLUSH MOUNT)
DWG.No.	C4445-G02- A REF.No. 19-028-220G-1		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

S-1



注記

＊１）造船所手配。

＊２）オプション。

＊３）コネクタは工場にて取付済み。

＊４）レーダーセンサーに接続するとき、整流器はRU-3423を使用する。

NOTE

*1: SHIPYARD SUPPLY.

*2: OPTION.

*3: CONNECTOR PLUG FITTED AT FACTORY.

*4: USE RECTIFIER RU-3423 TO CONNECT A RADAR SENSOR.

DRAWN Jan. 24 '08 T.YAMASAKI		TITLE	MFD8/12
CHECKED Jan. 24 '08 T.TAKENO		名称	マルチファンクションディスプレイ 相互結線図
APPROVED Feb.20'08 R.Esumi			
SCALE	MASS kg	NAME	MULTI-FUNCTION DISPLAY INTERCONNECTION DIAGRAM
DWG No. C4444-C01- B	REF.No. 19-028-5002-2		

FURUNO ELECTRIC CO., LTD.

PACKING LIST

DCU12

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
ﾃﾞｨｽﾌﾟﾚｲｺﾝﾄﾛｰﾙﾕﾆｯﾄ DISPLAY CONTROL UNIT	412 / 262 / 157	DCU12 000-011-671-00	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP19-00601 001-023-040-00	1
付属品 ACCESSORIES			
付属品 ACCESSORIES		FP19-01101 001-023-060-00	1
工事材料 INSTALLATION MATERIALS		CP19-00800	
ｹｰﾌﾞﾙ組品 CABLE ASSY.	L=5M	DVI-D/D SINGLELINK 5M 000-149-054-00	1
ｹｰﾌﾞﾙ組品LAN LAN CABLE ASSEMBLY	L=3M	MOD-WPAS0001-030+ 000-164-609-10	1
ｹｰﾌﾞﾙ組品MJ CABLE ASSY.	L=3.5M	MJ-A3SPF0013-035C(5A) 000-157-939-10	1
工事材料 SPARE PARTS		CP19-00801 001-023-050-00	1
図書 DOCUMENT			
ﾌﾗｯｼｭﾏｳﾝﾄ型紙 FLUSH MOUNTING TEMPLATE JP/EN	210 / 297	C42-00704-* ﾜ/ｴｲ 000-167-224-1*	1

型式/ｺｰﾄﾞ番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

PACKING LIST

MPU-001-E/J

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
制御部 PROCESSOR UNIT	374 / 376 / 181	MPU-001-E/J 000-011-919-00 **	1
予備品 SPARE PARTS			
予備品 SPARE PARTS		SP19-00501 001-023-090-00	1
工事材料 INSTALLATION MATERIALS		CP19-00600	
ｹｰﾌﾞﾙ組品 CABLE ASSEMBLY	L=2M	FRUDD-18AFFM-L180 000-164-608-10	1
工事材料 INSTALLATION MATERIALS		CP19-00601 001-023-100-00	1
図書 DOCUMENT			
ﾋｭｰｽﾞ変更のお願い(和/英) NOTICE FOR FUSE REPLACEMENT	210 / 297	C42-00705-* 000-167-240-1*	1
取扱説明書 OPERATOR'S MANUAL	210 / 297	OM*-44461-* 000-167-235-1* **	1
操作要領書 OPERATOR`S GUIDE(MLG)	210 / 297	OSJ/MLG-44460-* 000-167-220-1* **	1
装備要領書 INSTALLATION MANUAL	210 / 297	IM*-44460-* 000-167-222-1* **	1
取扱説明CD OPERATOR'S MANUAL CD	142 / 125	NAVNET3 O/M *CD-ROM* 000-167-721-1*	1
書類ｹｰｽ DOCUMENTS CASE	233 / 25 / 293	H293XW230XT18 000-168-580-10	1

1.ｺｰﾄﾞ番号末尾の[**]は、選択品の代表ｺｰﾄﾞを表します。
CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

2.一部の図書は、書類ｹｰｽに収められています。
A PART OF THE DOCUMENTS IS PUT IN THE DOCUMENTS CASE.

型式/ｺｰﾄﾞ番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

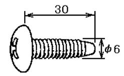
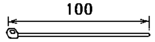
FURUNO

CODE NO.	001-023-100-00	19AY-X-9401 -1
TYPE	CP19-00601	1/1

工事材料表

INSTALLATION MATERIALS

MPU-001

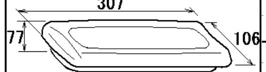
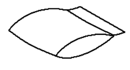
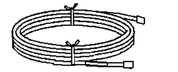
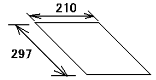
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW	 30 φ6	6X30 SUS304 CODE NO. 000-162-614-10	4	
2	ｺﾝﾍﾞｯｸｽ CABLE TIE	 100	CV-100N CODE NO. 000-162-167-10	4	

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。　なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

PACKING LIST

MCU-001

N A M E	O U T L I N E	DESCRIPTION/CODE No.	Q'TY
ユニット　UNIT			
操作部 CONTROL UNIT	 307 77 106	MCU-001 000-011-666-00	1
付属品　ACCESSORIES			
付属品 ACCESSORIES		FP19-01201 001-033-760-00	1
工事材料　INSTALLATION MATERIALS		CP19-00700	
ｹｰﾌﾞﾙ(組品)LAN CABLE ASSY.	 L=5M	MOD-Z072-050+ 000-167-176-10	1
工事材料 INSTALLATION MATERIALS		CP19-00701 001-023-070-00	1
図書　DOCUMENT			
ﾌﾗｯｼｭﾏｳﾝﾄ型紙 FLUSH MOUNTING TEMPLATE JP/EN	 210 297	C42-00703-* ﾜ/ｴｲ 000-167-223-1*	1

型式/ｺｰﾄﾞ番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。

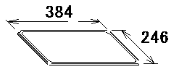
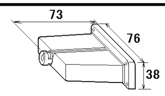
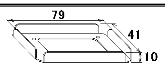
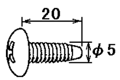
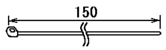
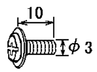
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	001-023-050-00	19AY-X-9403 -1
TYPE	CP19-00801	1/1

工事材料表
INSTALLATION MATERIALS

DCU12

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	Fﾏｳﾝﾄﾖｳｽﾎﾟﾝｼﾞ12 MOUNTING SPONGE		19-028-2062-0 CODE NO. 100-340-040-10	1	
2	DVIｶﾊﾞｰ DVI COVER		19-028-2131-1 CODE NO. 100-340-111-10	1	
3	DVIｶﾊﾞｰｵｻｴ板 COVER FIXING PLATE		19-028-2132-1 CODE NO. 100-340-121-10	1	
4	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		5X20 SUS304 CODE NO. 000-162-608-10	4	
5	ｺﾝﾍﾞｯｸｽ CONVEX		CV-150B CODE NO. 000-167-183-10	1	
6	+ﾊﾞｲﾝﾄﾞ小ﾈｼﾞ BINDING HEAD SCREW		M3X10 SUS304 CODE NO. 000-162-662-10	4	

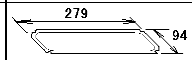
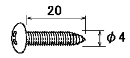
型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。
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（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	001-023-070-00	19AY-X-9402 -1
TYPE	CP19-00701	1/1

工事材料表
INSTALLATION MATERIALS

MCU-001

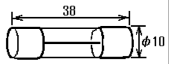
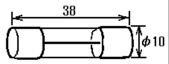
番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	Fマウントスポンジ BB MOUNTING SPONGE		19-028-1581-2 CODE NO. 100-340-742-10	1	
2	+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ 1ｼｭ SELF-TAPPING SCREW		4X20 SUS304 CODE NO. 000-158-850-10	4	

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	001-023-090-00	19AY-X-9302 -0 1/1
TYPE	SP19-00501	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	MPU-001		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE		FGB01 250V 10A PBF			4	000-155-787-10
2	ﾋｭｰｽﾞ FUSE		FGB01 250V 20A			4	000-155-775-10

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	19AY-X-9302	1/1

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

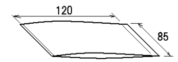
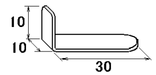
FURUNO

CODE NO.	001-023-060-00	19AY-X-9501 -1
TYPE	FP19-01101	1/1

付属品表

ACCESSORIES

MCU-001/DCU12

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾌｨﾙﾀｰｸﾘｰﾅｰ LCD CLEANING CLOTH		02-155-1082-1 CODE NO. 100-332-651-10	1	
2	ﾊﾟﾈﾙﾘﾑｰﾊﾞｰ PANEL REMOVER		19-028-3124-1 CODE NO. 100-340-471-10	1	

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。 なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

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FURUNO ELECTRIC CO., LTD.

19AY-X-9501

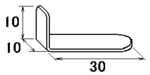
FURUNO

CODE NO.	001-033-760-00	19AY-X-9502 -0
TYPE	FP19-01201	1/1

付属品表

ACCESSORIES

MCU-001

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾊﾟﾈﾙﾘﾑｰﾊﾞｰ PANEL REMOVER		19-028-3124-1 CODE NO. 100-340-471-10	1	

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。　なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

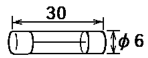
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO ELECTRIC CO ., LTD.　　19AY-X-9502

FURUNO

CODE NO.	001-023-040-00	19AY-X-9301 -0 1/1
TYPE	SP19-00601	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	DCU12		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE GLASS TUBE TYPE		FGBO-A 125V 5A PBF			2	000-155-853-10

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.	19AY-X-9301	1/1

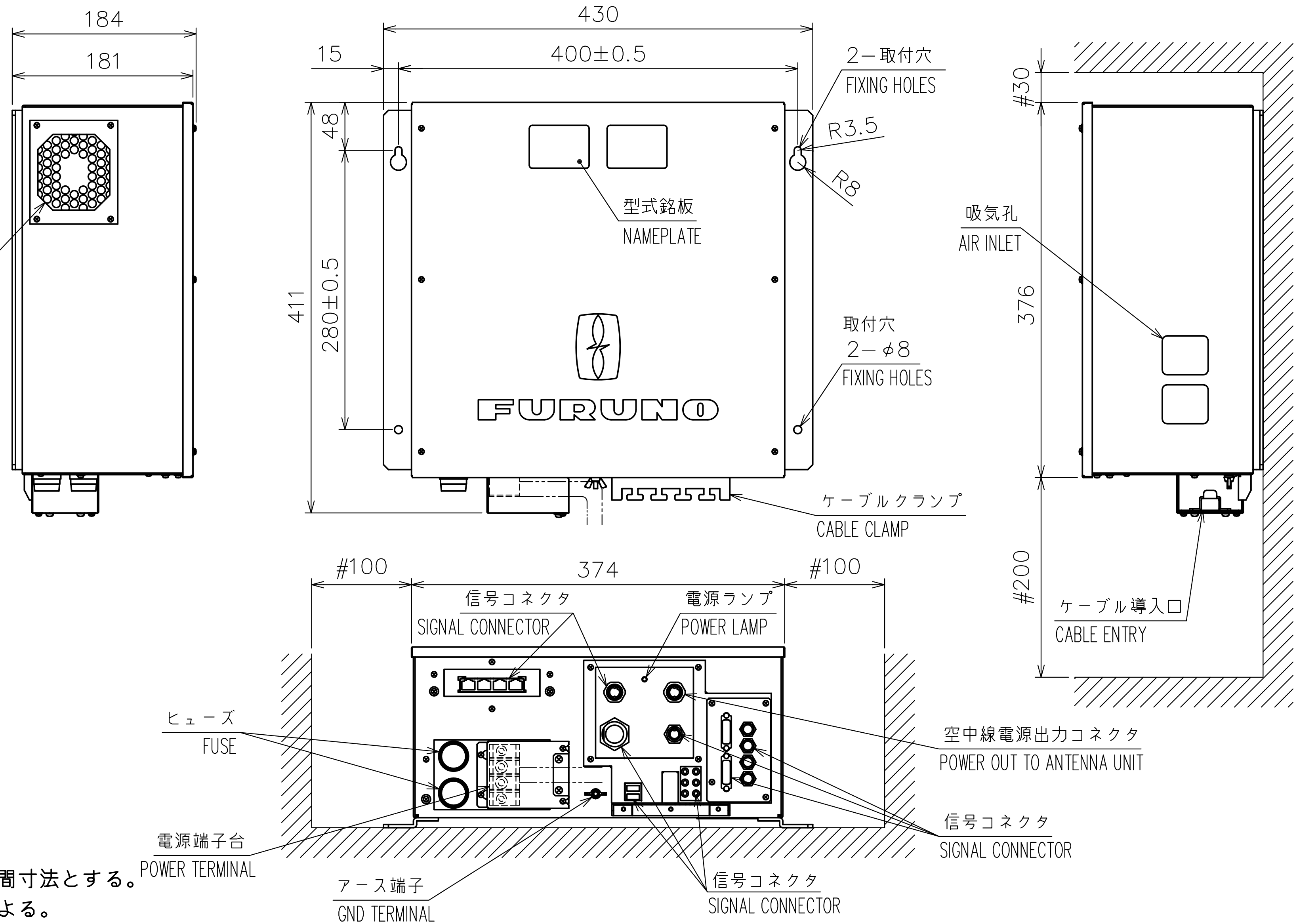
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

型式/ｺｰﾄﾞ番号が２段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。　なお、品質は変わりません。

TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3



注 記

1） ＃印寸法は最小サービス空間寸法とする。

2） 指定外の寸法公差は表１による。

3） 取付にはトラスタッピンネジ呼び径６×３０を使用のこと。

NOTE

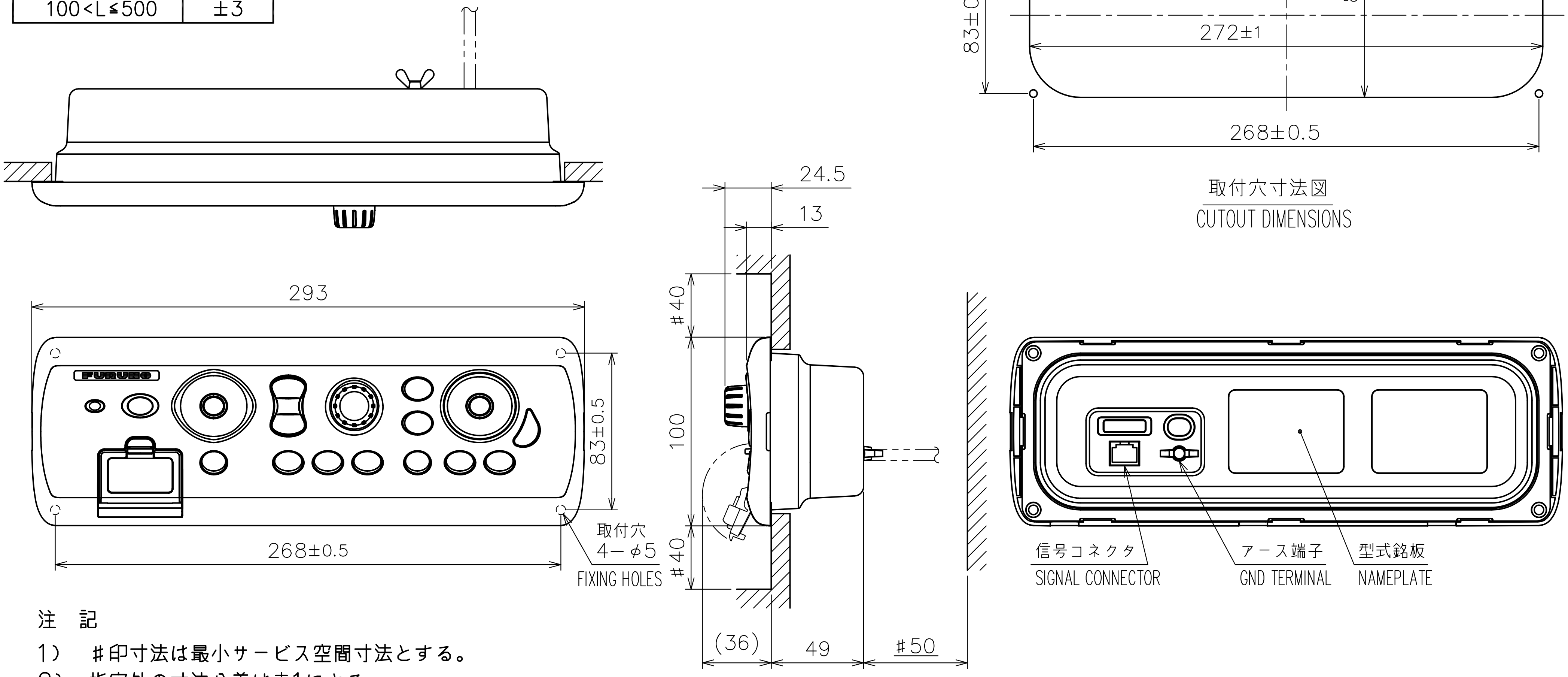
1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE TAPPING SCREWS φ6x30 FOR FIXING THE UNIT.

DRAWN Jun. 19 '07 T.YAMASAKI		TITLE	MPU-001
CHECKED Jun. 19 '07 T.TAKENO		名称	制御部
APPROVED Jun.27'07 R.Esumi	MFDBB		外寸図
SCALE 1/6	MASS 15 ±10% kg	NAME	PROCESSOR UNIT
DWG.No. C4446-G01- A	REF.No. 19-028-100G-2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3



注 記

1) #印寸法は最小サービス空間寸法とする。

2) 指定外の寸法公差は表1による。

3) 取付にはトラスタッピンネジ呼び径4X20を使用のこと。

NOTE

1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE TAPPING SCREWS ø4x20 FOR FIXING THE UNIT.

DRAWN Jun. 19 '07 T.YAMASAKI		TITLE	MCU-001
CHECKED Jun. 19 '07 T.TAKENO		名称	操作部
APPROVED Jun.27'07 R.Esumi	MFDBB		外寸図
SCALE 1/3	MASS 1.0 ±10% kg	NAME	CONTROL UNIT
DWG.No. C4446-G02- A	REF.No. 19-028-150G-1		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

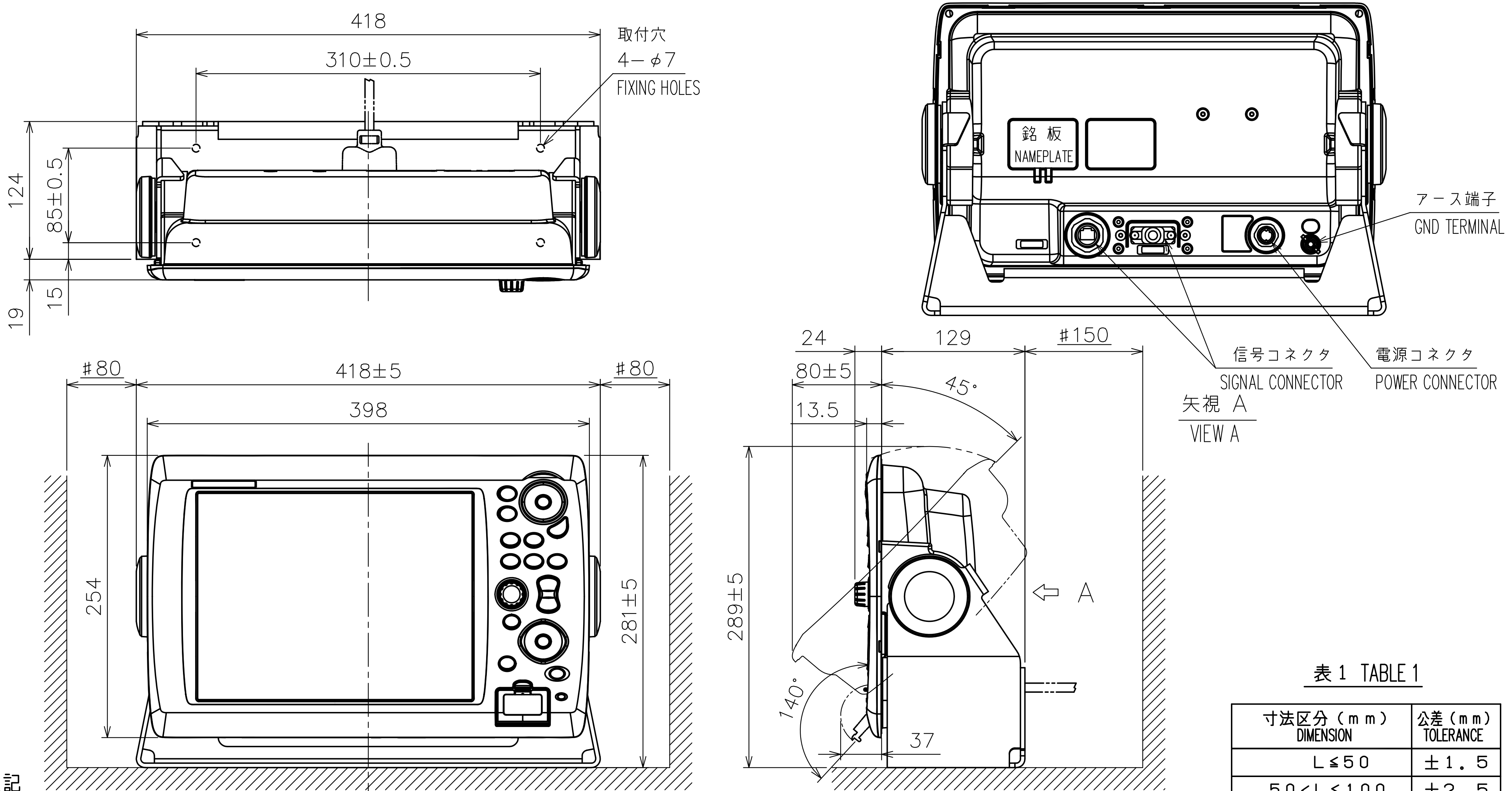


表 1 TABLE 1

寸法区分（ｍｍ） DIMENSION	公差（ｍｍ） TOLERANCE
Ｌ≦５０	±１．５
５０＜Ｌ≦１００	±２．５
１００＜Ｌ≦５００	±３

注記

1） ＃印寸法は最小サービス空間寸法とする。

2） 指定外の寸法公差は表１による。

3） 取付には＋トラスタッピンネジ５Ｘ２０を使用のこと。

NOTE

1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

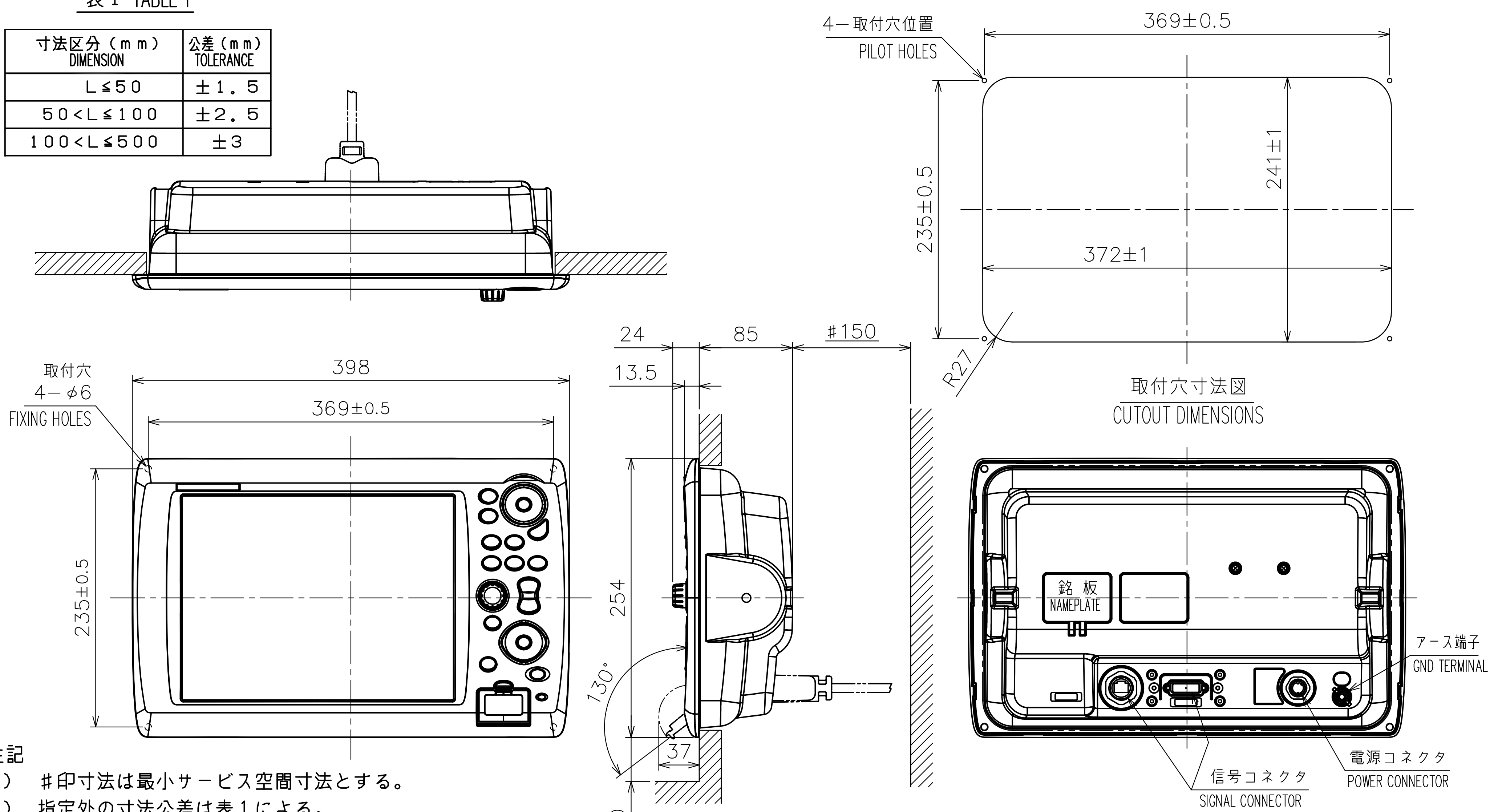
DRAWN	Oct. 17 '07 T.YAMASAKI	TITLE	DCU12
CHECKED	Oct. 18 '07 T.TAKENO	名称	ディスプレイコントロールユニット（卓上装備）
APPROVED	Oct.22'07 R.Esumi	MFDBB	外寸図
SCALE	1/5 MASS 5.7 ±10% kg	NAME	DISPLAY CONTROL UNIT (TABLETOP MOUNT)
DWG.No.	C4446-G03- B	REF.No. 19-028-215G-3	OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

表 1 TABLE 1

寸法区分（ｍｍ） DIMENSION	公差（ｍｍ） TOLERANCE
Ｌ≦５０	±１．５
５０<Ｌ≦１００	±２．５
１００<Ｌ≦５００	±３



注記

1） ＃印寸法は最小サービス空間寸法とする。

2） 指定外の寸法公差は表１による。

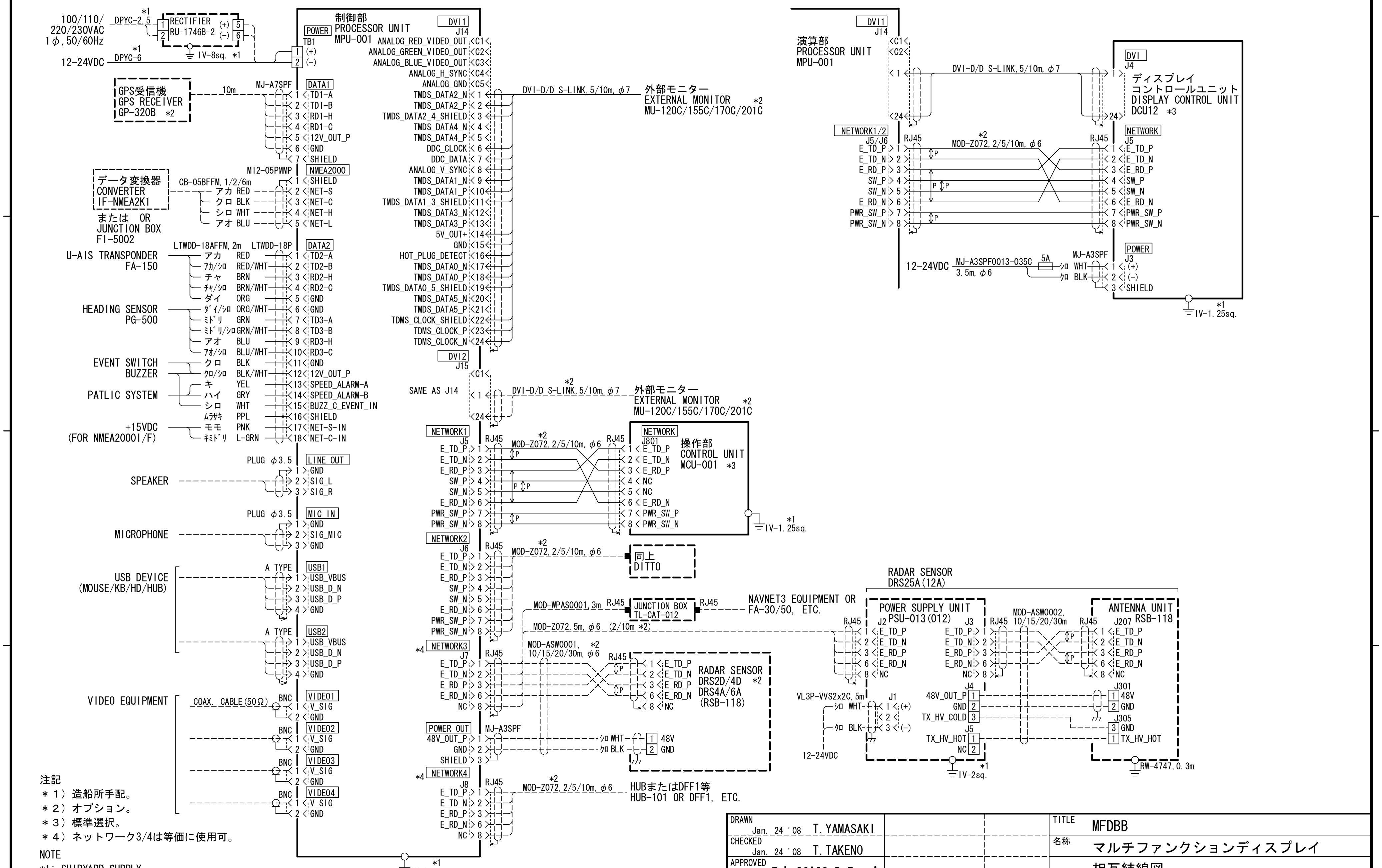
3） 取付には＋トラスタッピンネジ５Ｘ２０を使用のこと。

NOTE

1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE TAPPING SCREWS ø5x20 FOR FIXING THE UNIT.

DRAWN Oct. 17 '07 T.YAMASAKI		TITLE	DCU12
CHECKED Oct. 18 '07 T.TAKENO		名称	ディスプレイコントロールユニット（埋込装備）
APPROVED Oct.22'07 R.Esumi	MFDBB		外寸図
SCALE 1/5	MASS 4.2 ±10% kg	NAME	DISPLAY CONTROL UNIT (FLUSH MOUNT)
DWG.No. C4446-G04- B	REF.No. 19-028-210G-2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.



注記
＊1）造船所手配。
＊2）オプション。
＊3）標準選択。
＊4）ネットワーク3/4は等価に使用可。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.
*3: SELECTABLE STANDARD.
*4: NETWORK 3/4 ARE USED EQUIVALENTLY.

DRAWN	Jan. 24 '08 T.YAMASAKI	TITLE	MFDBB
CHECKED	Jan. 24 '08 T.TAKENO	名称	マルチファンクションディスプレイ
APPROVED	Feb.20'08 R.Esumi		相互結線図
SCALE	MASS kg	NAME	MULTI-FUNCTION DISPLAY
DWG No.	C4446-C01- B	REF.No. 19-028-7003-2	INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.

ECF
(Elemental Chlorine Free)
The paper used in this manual is elemental chlorine free.

FURUNO ELECTRIC CO., LTD.

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 Printed in Japan

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(HIMA) MFDBB

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